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THE FEASIBILITY OF A TROPICAL PLYWOOD FUTURES CONTRACT

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EXECUTIVE SUMMARY

(i) Since the early 1970s, the number and variety of futures contracts traded worldwide has increased dramatically. Financial futures contracts (for currencies and interest rates) were added to the commodity futures which had been traded since the latter part of the last century; futures contracts were introduced in industries then still dominated by large producers (e.g. aluminium, crude oil); and, most recently, a number of contracts have been introduced in sectors where futures trade was previously considered impossible (e.g. electricity, frozen shrimps, paper). In parallel to this expansion in the range of contracts traded, there has also been a shift of futures trade away from the traditional centres, first from the United States of America to Europe and Japan, and then more and more to developing countries.

(ii) Now, futures contracts are actively traded in a wide range of commodity sectors; in fact, there are few large sectors where futures trade has not been tried. One notable exception is tropical plywood, an industry with international trade worth over US$ 6 billion a year. Contrary to most of the other sectors where futures trade has not yet been introduced successfully (such as logs, of which dozens, if not hundreds of types are actively traded; diamonds, the production and trade of which is dominated by De Beers; or rice, for which world trade is basically the residual of national production policies), there would appear to be no prima facie reason to think that the introduction of a tropical plywood futures market is not feasible. Indeed, futures contracts have been introduced, admittedly without great success, for the similar markets in lumber and softwood plywood in the United States.

(iii) A contract for tropical plywood is actually offered (and actively traded) on the Shanghai Commodity Exchange. However, Chinese policy does not yet allow foreign companies to use this contract, nor is it likely that the other conditions for such international use (such as a transparent physical market for plywood, and the creation of alternative outlets for speculative investment in China) will be put in place in the years to come. As long as the Chinese contract remains purely domestic, there would seem to be a prima facie case for introducing a truly international contract elsewhere, and considering their predominance in tropical plywood production, Malaysia and Indonesia would seem good locations, together with Japan (the main consumer of tropical plywood) and Singapore (as a major financial hub in South-East Asia). As industry interest has been expressed most clearly in Malaysia, this study evaluates the potential for introducing an international tropical plywood futures contract in Malaysia's Kuala Lumpur Commodity Exchange (KLCE) by looking at three issues:

(1) Is there an objective need for such a contract and would it be of use to the industry?
(2) Is it technically feasible to introduce a futures contract, considering the diversity of plywood production in terms of products and production sites?
(3) Does the industry feel a need for such a contract?

(iv) Is there an objective need for a futures contract for tropical plywood? This study finds that the plywood industry exhibits several characteristics which would seem to indicate that it is indeed exposed to the types of pressure that can be countered through the use of futures contracts. In other words, a futures market would be of major benefit to the tropical plywood industry, making tropical plywood more competitive compared to softwood plywood and new plywood substitutes. The following characteristics in particular deserve a mention:

- Low profit margins. In most regions (with the exception of Sarawak), the majority of mills are under pressure from rising log prices and relatively low plywood prices (which are partly the result of competition from cheaper substitutes such as oriented strand board (OSB) and medium-density fibreboard (MDF)). Relatively small price declines, compared to the levels prevailing in early 1997, could eliminate most of their profits. The bottom line for their plywood operations is important to these companies: although often part of larger groups, most are independently registered companies which show little diversification outside the timber sector.

- Short-term contracting practices for plywood sales. Most plywood is sold one or two months forward, and sales are hardly ever for periods beyond three months forward. This hinders the capacity of mills to plan their production, that is, to determine which types of logs they need, procure these logs in time and at an acceptable price, and organize the logistics of production and transport in such a way that delivery is on time. The main reason for this lack of forward contracting seems to be price risk, that is, the difficulty in setting a forward price that is acceptable to both parties.

- The predominance of production-to-order. Most plywood is produced for a specific order. Production of plywood in expectation of finding a buyer later is relatively scarce, and plywood inventories at the producer level are very low (despite the fact that plywood is easily storable). Plywood mills often seem to be the victim of the delivery schedules requested by their buyers: they find it difficult to optimize their production pattern by producing longer runs of certain products for storage. There are three main reasons for this: lack of sufficient storage capacity, financing costs, and the price risks one takes on unsold plywood. High financing costs are not untypical for industries which are not very transparent and lack of price transparency is one of the components of this.

- The prevalence of letter-of-credit conditions in international trade contracts. This is a relatively expensive form of payment, but common when there is a serious risk of payment default. Payment defaults, in turn, are often the result of exposure to price risks (price changes encourage contracting parties who have not protected themselves against such changes to default).

(v) A tropical plywood futures market would not be a panacea for all of the problems of the tropical plywood sector, but a futures market would make it possible to cope with some of the problems relating to marketing and pricing tropical plywood, allowing senior managers to concentrate on the wider challenges. Experience shows that major indirect benefits in terms of better operating and marketing efficiency could be expected. A plywood futures market would lead to better use of resources, better margins of client business and the addition of new clients. There are also a number of direct benefits, including better capacity for entry into long-term contracts, better production logistics and more flexible marketing.

(vi) At the moment, most of the pressure of price risk exposure seems to be on plywood producers. Plywood buyers appear to be somewhat insulated from these risks. Indeed, with letter-of-credit conditions in contracts, they can easily negotiate a price discount if world market prices decline after signature of a fixed-price contract since, in practice, letters of credit very often have discrepancies; sellers do not have this luxury. Importers (and possibly also plywood

producers in the main consuming country, Japan) seem to be able to pass on cost increases to consumers. They also carry only a limited inventory, and do not enter into longer-term contracts with their clients.

(vii) Thus, the need for a price risk management tool (or the direct benefits of such a tool) seems to be largely restricted to the producers, especially those in developing countries. While in the long run it would appear to be in the interest of importers and end-users to keep the tropical plywood sector viable, they do not depend on this industry: many end users have shifted to the use of softwood plywood and substitutes such as OSB and MDF, often encouraged by importers who not only find the supply of these alternatives more reliable, but have also, in a number of cases, invested in their production.

(viii) Is it technically feasible to introduce a futures contract, considering the diversity of plywood production, in terms of products and production sites? This study finds that it is. The underlying market is sufficiently large, and international trade is relatively free. Tropical hardwood plywood consists of a large number of physically different products, with different sizes, thicknesses, types of glue, colours, fire resistance and other structural characteristics, but for risk management, this is largely irrelevant: what matters is whether prices move in the same way. The prices of thin plywoods (those up to about 12 mm) behave in quite a similar manner, irrespective of all their differing characteristics; the price differences between the different types of plywood and 3 mm plywood (the most common product) vary much less than the prices themselves. This means that producers and others active in the industry can reduce their exposure to price risk even if they produce, say, mostly 12 mm plywood and the standard of the futures contract is 3 mm plywood: when using the contract for risk management, they would replace their exposure to the risk of absolute price variations for their plywood with the much smaller risk of a greater difference between the prices for their plywood and 3 mm plywood.

(ix) Delivery procedures could be a problem, but one which could be resolved if the industry was willing. There are two principal ways to close out a futures contract: by physical delivery or by cash settlement (there are hybrid forms, but these are generally not advisable). Cash settlement is virtually excluded because of the difficulty in finding reliable cash quotations: effective prices are simply not publicly available. So physical delivery is the only possibility. With physical delivery, one needs to decide on the range of commodities deliverable, the standard contract size, the delivery locations and, delivery procedures (ex-warehouse? f.o.b.? does one allow Exchanges of Futures for Physicals (EFPs)?).

(x) Making delivery against a futures contract is unlikely to be a problem: the company making the delivery can chose which particular product, within the ranges deemed deliverable under the contract, it wishes to deliver, and at which of the exchange's delivery locations. Taking delivery is more of a problem: one cannot know in advance which type of plywood will be delivered, and at which port. Therefore, it is crucial that the range of products and ports specified in the futures contract is such that, even in the worst-case scenario, a company taking delivery can re-sell the plywood at a fair price. Otherwise, as contract maturity approaches, the plywood price will be quite low, reflecting this worst-case scenario, which would not be in the interests of the plywood mills themselves. This means that one should only include major ports from which shipment is easy, and major types of plywood for which there is a price-competitive market; 3 mm plywood would seem a logical choice. If Indonesian plywood is made deliverable against the

contract, with delivery locations in Indonesian ports, there is enough 3 mm plywood, produced by a sufficiently large number of mills and available from a sufficiently limited number of ports, to make market manipulation difficult and a contract easy to use. However, if, for organizational reasons, it was difficult to make Indonesian plywood deliverable against a futures contract, the issue of the availability of plywood for delivery would need to be looked into in further detail; if manipulation is suspected it may then be necessary for the exchange to use a new "safety-valve" mechanism, perhaps by allowing contracts to be closed out at an administratively determined price.

(xi) As concerns the range of quantities deliverable, it is proposed to use, as standard, 3 mm plywood, corresponding to either Japanese or United States standards, and in either 4 × 8' (ft) or 3 × 6' size. Delivery of other types of plywood would be possible through EFPs only. The ready supply of such standard plywood is sufficiently high, and many factories have the flexibility to produce it in the short run if prices are reasonable.

(xii) The standard contract size of a futures contract cannot be too large. For a large part of their turnover, futures markets depend on small speculators, who could not afford large contracts and the risks they bring. A contract size of 10 m^3 is proposed here; this would represent a value of some US$ 4,000 - 5,000, similar to the size of the KLCE palm-oil futures contract. Linked to the size of the contract is the size of the "tick", or minimum price change on the exchange. A tick of US$ 1 per m^3 is proposed here (in other words, contract trade is only possible in full dollars, a trader on the exchange floor is not allowed to sell a contract at, say, US $ 400.50). This tick size means that a local broker on the exchange floor who can resell a contract for even one tick above the price he has paid already makes a net profit ; his gross profit then is US$ 10 per contract, and the exchange's commission is around US$ 5 per contract. However, the issue of contract size merits further consideration. Considering the relatively low price volatility of plywood, can one expect sufficient US$ 1 price movements on a given day to make it worthwhile for floor traders? If not, one could consider making the contract larger (perhaps up to 50 m^3), while reducing the tick size to 20 US$ cents per m^3.

(xiii) As to delivery locations, there are four problems: there are many export ports; many of these ports have no plywood warehouses, as exporters store their plywood at the mill and transport it to the port only for loading; transport is not in standard lots, but often in bulk (however, contrast, as long as the quantity of plywood to be transported is commercially attractive, there is no lack of general cargo space in the main ports); and contract size varies enormously, from 10 to 500 m^3. Still, the situation is not as bad as one might think at first sight. Firstly, 10 ports in Malaysia and Indonesia, most of them in Borneo, account for the majority of tropical plywood exports. Secondly, it would not be too difficult or expensive to add customs-free warehousing space for plywood in the major ports. And thirdly, the problem of transport is nor insurmountable if the mills have the will to overcome it.

(xiv) The exchange could specify that making or taking delivery was only possible in multiples of a certain number of futures contracts, for example, 10 contracts of 10 m^3 each. This would ensure that the size of delivery was not too small to make delivery potentially uneconomical. Nevertheless, one could not make this minimum delivery size so large that only very well capitalized firms were able to make or take delivery, as this would hinder the functioning of the market. If shipment by container were common, a container would have been a good standard

contract size, but shipment by container is rare (except in the case of fancy plywood). Normally, plywood is shipped in bulk, often together with sawnwood. Obviously, a container-size quantity of plywood in a port is of little value to its owner if he is unable to arrange transport to a buyer. It needs to be determined whether it would be easy to ship out the minimum delivery size of 100 m^3 from each of the proposed delivery ports. If not, this would be a major problem, which could only be resolved by either excluding particular ports from the list of delivery locations (which would make the market easier to manipulate and less representative), or, with the agreement of the main mills shipping through a port, by allowing third parties (such as a non-local company or a company from another country), who have become the owner of a quantity of plywood through the exchange's delivery process, to ship their small lot as part of a larger shipment arranged from the port, paying no more than a fair share of the costs. Details of the proposed futures contract are summarized in the table below.

Details of the proposed futures contract specifications

Contract size	10 m^3 (or six 1.7-1.8 m^3 crates); minimum physical delivery size 100 m^3
Currency	US$
Underlying commodity	2.7-3.2 mm plywood, 4 × 8' or 3 × 6' panels.
Delivery locations	f.o.b. Kota Kinabalu, Sepangar Bay, Sandakan, Miri, Bintulu, Sibu, Samarinda, Banjarmasin, Pontianak, Pekanbaru. Six-monthly revised discount for delivery ex-Malaysia as a function of transport cost differential from Malaysian and Indonesian ports to Shanghai.
Alternative delivery mechanisms	EFPs allowed.
Tick size	US$ 1 per m^3
Daily price limits	5 %
Quality	Japanese or United States standards; in the event of conflict, recourse to a Malaysian arbitration panel.

(xv) Does the industry see a need for such a contract? In Malaysia, the most vocal supporters of a contract come from the industry in Sarawak, who, objectively, need it the least, since their production costs are lower than those of their competitors from Sabah, Peninsular Malaysia and Indonesia. The mills in Peninsular Malaysia are often still oriented to their traditional European markets, producing thicker types of plywood, and a futures contract would not solve their main problem, which is the lack of access to timber. One could argue that in Sabah, too, the problem of log supply is likely to absorb much more attention than the opportunities provided by a futures contract. Nevertheless, the industry in Sabah, with its strong links to the Chinese industry and fairly acceptable profit margins, could well benefit most from a plywood futures contract. In Indonesia, Apkindo has adopted a positive attitude, without necessarily being willing to back a futures market in Malaysia. This is in itself quite a good sign, but the likelihood of success of a tropical plywood futures contract, which, as has been noted would be of benefit to the whole plywood industry, would be enhanced if Apkindo were to take a more constructive and more proactive attitude.

(xvi) Traders in Taiwan Province of China and China have shown a strong interest in a futures contract, although much of their interest is focussed on the arbitrage possibilities that a new market in Malaysia would provide, as compared with the existing and very large futures contract in Shanghai. In Japan, there appears to be no interest at all. In fact, several of the large Japanese importers are promoting the use of products such as MDF, OSB and temperate hardwood, as well as softwood plywood, rather than tropical hardwood plywood. A major effort will have to be made to convince the Japanese plywood importers of the benefits of a futures market. Exporters should also consider whether they can include delivery on an EFP basis in the standard contracts; importers would then have little choice but to use the futures market. The recent emergence of new independent buyers (large construction, furniture and distribution companies which wish to bypass the traditional importers) will make it easier to get buyers to use the futures market.

(xvii) In conclusion, the producers of tropical plywood could benefit greatly from the introduction of a tropical plywood futures contract. As competitive pressures would ensure that some of these benefits are distributed to buyers and end users, the latter groups would also benefit. However, from an organizational point of view, it will not be easy to create a viable futures contract. One problem is that although many producers appear to be aware of the potential benefits of a futures contract, the same cannot be said of buyers, let alone end-users. To change this attitude, producers will need to make a major effort to educate their clients, including through the use of a new type of pricing formula in their contracts. Producers will also need to make a number of commitments to ensure a viable delivery mechanism. For the exchange, the best way to move forward on introducing a plywood futures contract would be to set up a committee of industry representatives (including representatives of the Indonesian plywood industry), charged with discussing contract specifications, as well as the following:

- Verification of the interest of the plywood industry in a plywood futures market, and the organization of a comprehensive awareness-raising and training programme;
- Obtaining the permission of the Indonesian Government for its plywood mills to use a Malaysian futures contract;
- Elaboration of a viable delivery mechanism, which may imply the obtaining of written commitments from key exporters to allow those taking delivery to "share their transport arrangements;
- Design of a mechanism (e.g. new standard pricing clauses in contracts) to convince buyers to use the futures market.

(xviii) Only after these steps have been taken can the exchange introduce a futures contract. There is not that much time to do all of this. The Shanghai futures market has an active trade in plywood, and is very much interested in opening its market to foreign users once the Chinese Government allows it. If, by the time that happens (and it may be only some 3 to 5 years away), a new exchange in Kuala Lumpur has built up good liquidity, it should be possible for the two markets to exist side by side (although it might be best for them to establish a trading link). However, if liquidity in Kuala Lumpur was low, users would move to Shanghai.

INTRODUCTION

1. International trade in tropical plywood is worth some US$ 6 billion a year. This makes it one of the few major internationally traded commodities for which, as yet, no futures contract exists. Neither industry and market structures nor contracting habits explain this. For the other major commodities without a futures contract, one can easily identify the grounds for its absence: in the case of diamonds, De Beers unilaterally determines prices, and has a huge buffer stock to manage this price-setting policy. For iron ore, negotiations once a year between the major producers and the major consumers set the year's prices. For fish and logs, the physical diversity of products is very large. For rice, imports and exports are largely the residual of government rice policies, and trade is dominated by a few trading houses. None of this really applies to plywood. Plywood prices, while not determined entirely freely, do fluctuate during the year, and price fluctuations are perceived as a problem by buyers and sellers. Most tropical plywood production is traded internationally. There are many players - the 10 largest producing companies control less than one third of world supply, and there are many traders and buyers.

2. The potential for an international tropical plywood futures contract depends on the objective and subjective need for a price risk management instrument, and on the technical feasibility of formulating a contract in such a way that it is sufficiently representative for the industry, and would not allow an easy manipulation of the market.

3. After a general introduction to the wood-based panels and tropical plywood sectors, this report discusses in more detail the way in which production and trade in tropical plywood function, including price behaviour, the actors, their operations, their contracting methods and price formation mechanisms. Their direct and indirect exposure to price risks, and the benefits they could draw from a futures market, are discussed in the next chapter. The technical feasibility of a futures contract is then discussed, in terms of the segmentation of markets (both in types of plywood and in countries of destination), flexibility of market operators and possible delivery mechanisms. The final chapter considers the next steps that should be taken for the development of a futures market.

4. This report has been written as part of UNCTAD's work on the relevance of and potential for commodity exchanges in developing countries and countries with economies in transition, and the potential for new commodity contracts. Previous work has been undertaken on the possibility of introducing internationally oriented futures contracts for cotton (to be traded in Turkey - see "Guidelines for facilitating access to risk management markets through the stimulation of local and regional exchanges: the case of cotton in the Near East/CIS/Pakistan", UNCTAD/COM/65, September 1995) and pepper (to be traded in India - see "Feasibility study on a worldwide pepper futures contract", UNCTAD/COM/64, October 1995). In both cases actual progress has been positive: an internationally oriented pepper futures contract was introduced in Kochi, India, in 1997, and a cotton futures contract is to be introduced in Izmir, Turkey, in 1998. Work on new exchanges and the development of existing ones has been undertaken in Indonesia, India, the Dominican Republic and (for grains) Turkey (for the lessons of this and related work see "Emerging commodity exchanges: from potential to success", UNCTAD/ITCD/COM/4, June 1997). As this report provides a broad analysis of the usefulness of a price risk management contract where none is available now, giving (in the annex) a detailed overview of how such a contract can be used, it will be one of the background papers for UNCTAD's Group of Experts meeting from 4 to 6 May 1998 to discuss the "Examination of the effectiveness and usefulness for commodity-dependent countries of new tools in commodity markets: risk management and collateralized finance".

Chapter I

TROPICAL PLYWOOD

A. The role of tropical plywood in the wood-based panels sector

5. The wood-based panels group of products includes four main types of panels[1]:

- Veneer;
- Plywood;
- Particle board; and
- Fibreboard (fibre building board).

Figure 1 gives an idea of the place of ordinary plywood in panel production as a whole, from a technical point of view.

6. Normally, a distinction is made between *structural panels*, which are used in building construction (such as concrete formwork, exterior siding and panelling, sheeting, roofing and flooring), and *industrial panels*, used in various industrial applications, especially furniture production, joinery, packaging, transport and audio-visual industries. While veneer sheet and plywood are "natural wood panels", characterized largely by the wood species used, the other two panel types are "reconstituted wood panels", manufactured from different types of wood waste bonded together with resins or other binding substances and pressed together to form panels.

7. *Veneer sheets* are thin sheets of wood of uniform thickness (usually not exceeding 5 mm) that are peeled, rotary cut, sliced or sawn for use in plywood, furniture, etc. There are two types of veneer sheets: *plywood veneers*, which are generally produced by a peeling process from the more common species of wood and are used for plywood production (therefore, in statistics, the production of these veneers is not counted separately); and *decorative veneers*, which are produced by slicing or sometimes by sawing finer highly grained woods and are used mainly in the furniture and wood-panelling industries. Decorative, or "fancy", veneer is normally produced by small, specialized mills in thinner sheets than plywood veneer, and is sold at a higher price.

8. *Plywood* is produced from three or more thin sheets (always an odd number) of veneer which are joined by an adhesive with the wood grain direction of each ply (or layer) at right angles to the adjacent one. In the case of *lumber core plywood* (or *blockboard*), the core (that is, the central layer, which is generally thicker than the other plies) is solid and consists of narrow boards, blocks or strips of wood placed side by side, which may or may not be glued together. *Cellular board* is plywood with a core of cellular construction, while *composite plywood*, is plywood with the core or certain layers made of material other than solid wood or veneers.

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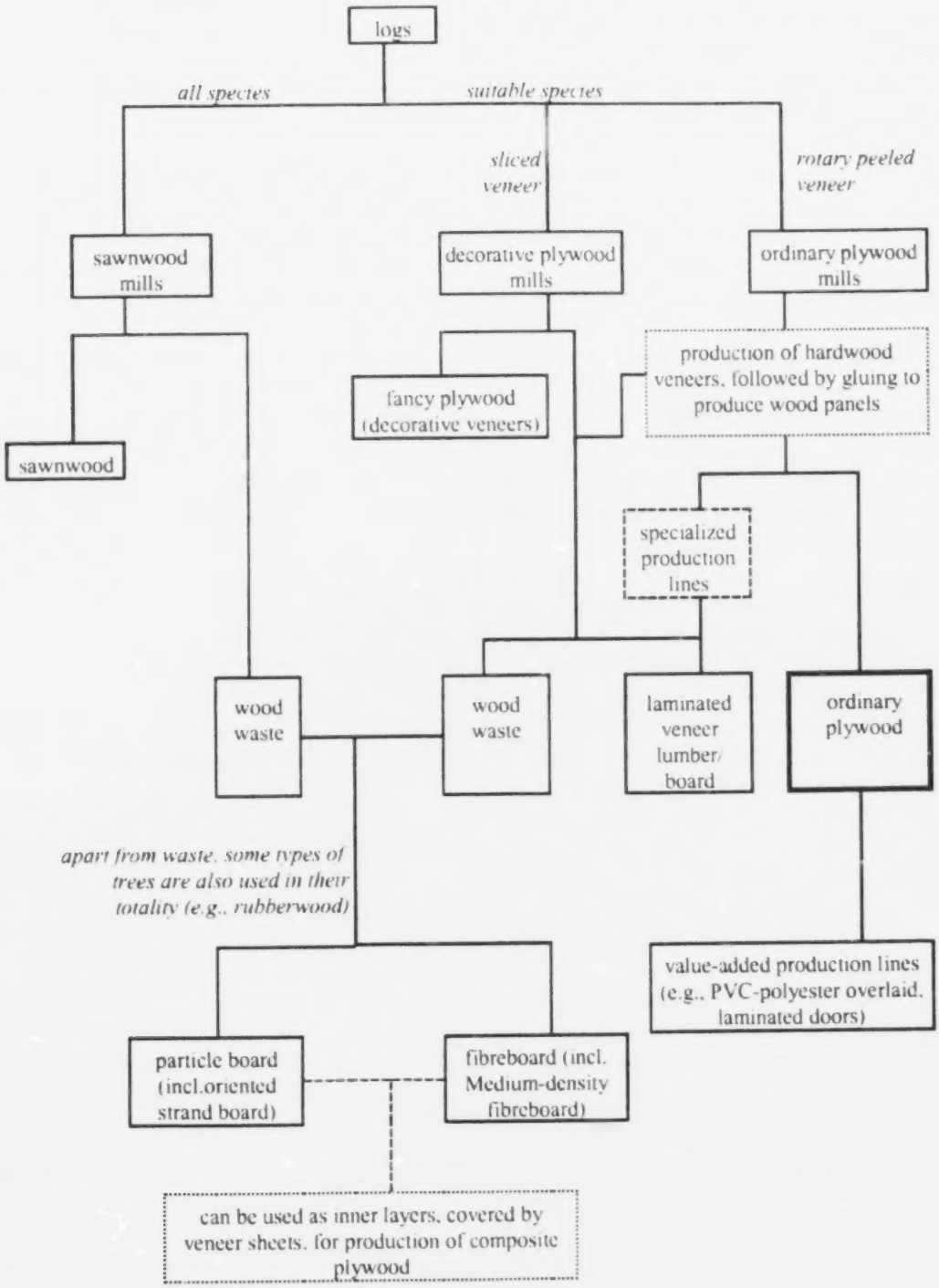
[1] Based on the definitions in the book Wood-Based Panels, a Study of Major Markets, International Trade Centre (ITC) UNCTAD/WTO, Geneva, 1987, P. xii - xvi, and Forest Product Year Book, 1983-1994, Food and Agricultural Organization of the United Nations (FAO), Rome, 1996, p. xi.

Figure I

The place of ordinary plywood in the production of wood panels


logs
all species
suitable species
sliced veneer
rotary peeled veneer
sawnwood mills
decorative plywood mills
ordinary plywood mills
production of hardwood veneers, followed by gluing to produce wood panels
fancy plywood (decorative veneers)
sawnwood
specialized production lines
wood waste
wood waste
laminated veneer lumber/ board
ordinary plywood
apart from waste, some types of trees are also used in their totality (e.g., rubberwood)
value-added production lines (e.g., PVC-polyester overlaid, laminated doors)
particle board (incl.oriented strand board)
fibreboard (incl. Medium-density fibreboard)
can be used as inner layers, covered by veneer sheets, for production of composite plywood

9. *Particle board* is the trade name for panels manufactured from small pieces of wood or other ligno-cellulosic materials (e.g. shavings, chips, flakes, splinters, strands, shreds, shives, sawdust or other wood waste) agglomerated with natural or artificial resins or organic binding substances and pressed together in the form of sheets, blocks, etc. The word *chipboard* is often used to designate the same product. The most common value-added product is melamine-faced chipboard (MFC). Particle board is also frequently overlaid with veneer, or laminates of printed paper, foil, and so on.

10. *Fibreboard* is usually manufactured from woodchips that have been mechanically defibred or steam-exploded or from other defibred ligno-cellulosic materials which are bonded together in the form of panels, either compressed or non-compressed. Depending on the degree of density, the board is traditionally referred to as *hardboard* (compressed), or *softboard* or *insulating board* (non-compressed); this latter category includes medium-density fibreboard (MDF).

11. The wood-based panel sector is in a continuous process of innovation. Two new products are laminated veneer lumber (LVL) and laminated veneer board (LVB). Although LVL is manufactured from scarf-jointed veneers, its main uses overlap with those of sawnwood; because of its structural resistance to fire, LVL has even been replacing steel in some construction applications such as warehousing. LVB is composed of small, square-sized veneers (the veneers are connected lengthwise to make longer pieces); it is thin and comparatively wide, and is mainly used as a sheet material.

12. There are also two other new types of panel which offer a more direct substitute for plywood, namely OSB (oriented strand board) and MDF (medium density fibreboard). OSB is strictly speaking a type of particle board, as it is made of several layers of long-fibre wood particles (strands) arranged successively at an angle and glued together, which gives great strength. OSB is mainly used in building construction and where high resistance is required. It can be produced from cheap raw materials, including the so-called weed species, which are in ample supply close to major consumption areas.

13. MDF is a fairly recent innovation, developed originally in the United States of America and Canada, which is making rapid inroads in many other countries (Malaysia is now a large exporter). Produced from products otherwise unsuitable for panel production (e.g. rubber tree scrap), MDF is mainly used for furniture-making.[2]

14. There is also a trend towards secondary processing, that is, further processing of ordinary plywood through lamination of a synthetic material (paper, direct printing or embossing). This may include using offset printing technology to create paper overlays of any conceivable pattern, or directly embossing grain patterns on the wood surface. In Japan for instance, overlay technology is also used to add a finish to temperate hardwoods such as oak, imported from the United States, for furniture or interior panelling (this gives them the type of appearance normally associated with tropical hardwoods).

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[2] OSB and MDF are not indicated separately in the existing international product classifications. Hence, their inclusion in national statistics does not follow a uniform pattern. MDF is generally included either under hardboard or under insulating board, while OSB is generally included either with particle board or with plywood. Efforts are now under way to revise the nomenclature with a view to adopting a common classification.

15. While some of these types of wood-based panels have specialized end-uses, many, especially the new panels, are functional substitutes: at least for some applications, processors can shift from one type to another, if and when the price is right. For example, OSB is challenging structural grade (thick) plywood within the construction industry, while MDF is competing mainly with particle board, but also with thin plywood, in furniture production. Moreover, engineered wood panels such as LVL are gradually replacing sawnwood in the housing industry.

16. World wood-based panel production is continuously increasing. According to estimates by the Food and Agriculture Organization of the United Nations (FAO), it reached 141,717,000 m^3 in 1994, with particle board accounting for 37 per cent of this, and plywood for 35 per cent. It should be noted, however, that statistics on wood-based panels and plywood production vary greatly from one source to another; for example, estimates by the Malaysian Timber Council put the total production figure for 1994 at 20 million m^3 less than the FAO figure (see table 1). A total of 109 countries produced wood-based panels, with the United States accounting for almost one quarter of total production. World production of tropical plywood totalled 23.16 million m^3 in 1994, again according to the FAO (a little under half of total plywood production, and less than one sixth of total wood-based panels production). The International Tropical Timber Organization, counting only its own member countries (which account for virtually all world tropical plywood production), put this figure at just over 20 million m^3.

Table 1

World production of panel products
(millions of m^3)

	1990	1994
Particle board	50.4	49.5
Plywood	48.4	47.6
OSB	6.7	11.2
MDF	8.9	12.8

Source: Malaysian Timber Council

B. A closer look at the production and use of tropical plywood

17. Plywood is made either of softwood (e. g. pine, spruce), temperate hardwood (e.g. birch, beech, oak) or tropical hardwood (e.g. lauan, okoumé, mahogany). Its price depends largely on the rarity and technical characteristics of the wood species used. Birch plywood is the most expensive; softwood plywoods tend to be the cheapest.

18. The standard plywood made from tropical hardwood is usually of meranti, lauan, keruing, seraya or similar species. Some wood species are red while others are light in colour; buyers are usually willing to pay a premium for plywood supplies in a specific colour, but, overall, there are no systematic differences between the prices of red and light-coloured plywoods. As regards decorative plywood, African mahogany and okoumé (from Gabon) are also quite popular, although they are more expensive than lauan plywood due to the limited supply of raw material.

19. The main producers of tropical plywood are Indonesia, Malaysia and Japan (see table 2); Malaysia overtook Japan only in 1995. This is completely different from the situation in the early 1980s, when Japan, the Republic of Korea and Taiwan Province of China were the dominating producers of tropical plywood, using imported logs. Japan's production (and the number of its plywood mills) continues to decline, and its remaining (over 100) mills which produce ordinary plywood have generally moved away from the production of thin plywoods to the production of thick ones, where the quality of raw material is less of a problem. Latin American plywood exports have been increasing fast, although they stagnated in 1996; but as Latin American exporters have had to build up their share in the world market, this export growth has had an impact on the competitiveness of the market, with competition on the basis of prices becoming more important.

20. Plywood mills compete for their log supply with sawnwood mills. Sawnwood mills are more flexible, and the logs suited for plywood production normally carry a premium. The availability of suitable logs is often a problem, especially for the production of thinner plywood: for thick plywood, one can use wood of poorer quality for the inside veneers, but for thin plywood one needs a relatively large amount of "face" material, and thus a relatively large supply of high-quality logs. As logs are normally bought in lots of different species, quality is difficult to control, except for those plywood mills which have their own concessions or plantations.

Table 2

Main tropical plywood producers,
1992 and 1996

Country	Production thousands of m^3		Share of 1996 production which was exported
	1992	1996	
Indonesia	10 100	8 594	93 %
Malaysia	2 062	3 685	91 %
Japan	5 477	3 307	-
Brazil	1 100	1 320	42 %
Republic of Korea	942	850	-
China	500	650	8 %
Taiwan Province of China	1 100	350	47 %
India	360	360	8 %
Others	1 416	1 467	
World total	23 057	18 583	

Source: International Tropical Timber Organization, *Annual Review and Assessment of the World Tropical Timber Situation*, 1996

21. In Indonesia, most plywood mills have their own concessions or estates (in fact to get a timber concession, one was required by law to set up a mill); many of the mills in Sarawak, Malaysia are also associated to concessions. In both cases, the mills were in effect often set up as part of a vertical diversification strategy by the timber companies. In Peninsular Malaysia, mills have little or no timber land, and in Sabah, only the state-owned timber companies and two or three others have their own timber land. But even those mills with access to their own logs procure a large part of their log supply on the open market, primarily for reasons of logistics (timber land is not always optimally located in relation to the mill). Moreover they pay a market-related price for logs from their related timber companies. The prices they pay for logs are thus directly linked to international prices - that is, under upward pressure from demand from Japan and the Republic of Korea. As it becomes increasingly difficult to procure logs in these countries, mills which do not own their own concessions tend to find themselves in difficulties, and it is expected that, in the years to come, many of them will go out of business, leaving plywood production mainly in the hands of companies with their own timber land.

22. Log production is seasonal. In Malaysia, during the monsoon (November-January), production comes to a halt. Mills try to build up stocks to continue producing during this off-season (at least, as long as plywood prices are reasonable), but the difficulty in obtaining sufficient logs at reasonable prices (inventory price risk is not an important factor) often means they have to close factories for a month or longer. In Indonesia, production is low during the rainy season, in the first quarter of the year, when logs are difficult to transport to the river (the most common transport system); and it is also low in the hot season from June to September, as river levels fall. Indonesian mills tend to keep relatively high log reserves (compared to the Malaysian companies) to cope with these supply risks.

23. Once cut, some species of logs (especially sinkers) are fairly durable, but in general, deterioration sets in quite rapidly, due to humidity and insect attacks. The decline in value is then 1-3 per cent a month, depending on the hardness of the wood. Because of this, and because of financing costs, plywood mills are hardly in a position to build up large stocks in order to meet export orders in a prompt manner.

24. In terms of production flexibility, the type of machinery available, as well as access to log supply, plays a role. Broadly speaking, there are three types of plywood mills:

- Old mills, typically set up to meet certain standard specifications (often thicker sizes, oriented at the then predominant European market), produce a range of sizes, but are not flexible enough to alter their product mix in a radical manner. Most of the mills in Peninsular Malaysia fall into this category, as do many of the mills in Sumatra, Indonesia.
- In mills set up for one market, all the machinery is tailor-made to produce, in general, just one thickness and one panel size. This is the case for many of the mills in Sabah (generally transplanted from Taiwan Province of China) and the new mills in Sarawak, which produce 3 mm plywood for the Chinese and, to a lesser extent, Japanese markets. It is also the case for many of the mills in Indonesia, with production lines specially set up to produce 3 × 6' panels for the Japanese market. A mill producing 4 × 8' (ft) panels could shift to production of 3 × 6', but the higher prices (5 per cent higher per square foot) do not make up for the losses in efficiency: electricity usage for producing each single panel would be the same, and the dryers would still be able to process only the same number of panels, meaning that capacity would decline by over 40 per cent. These

specialized mills generally have the lowest production costs, and are present in most producing regions, but perhaps their greatest concentration is in Sarawak, where plywood production took off relatively recent, and where the timber companies investing in plywood mills have bought the latest technology.

- Modern mills with the flexibility to shift production from one thickness or size to another relatively easily are in a minority. In some cases, mills have different production lines, each of which could fall into any of the above categories. In response to low profit margins on standard products, many mills are also trying to diversify into higher value-added products, such as floorboards or laminated products.

25. Thicker plywood panels - 12 mm and upward - are much used in the construction industry. While some types are in fairly general use, others have more specialized applications (24 mm plywood, for example, being used mostly in the construction of high-rise buildings). Their use in the construction industry means that demand is seasonal, being low in late December (the northern hemisphere's winter months and Australia's summer holidays), as well as during July and August. It also means there is a direct link between demand for plywood and the growth of construction activity, which, in turn, is one of the main indicators for overall economic growth. Thick panels are also used for furniture production; for example, 18 mm plywood is the standard grade used for cabinet doors.

26. Thinner panels are also used for furniture as well as for construction; for example, 6 mm plywood is a favourite product for wall panelling. Thin panels are also widely used in the do-it-yourself sector, and in various industrial applications (e.g. toys, audio-visual equipment, musical instruments).

27. While the types of thick panels in demand in the main markets are fairly similar, the same cannot be said for thin panels. Table 3 gives the general thickness produced for the United States (IHPA standard), Japan (where, in the case of imports, IHPA thicknesses are the norm, rather than the local JPIC standards) and Europe (B/S standard). In terms of size, 4 × 8' panels are the standard in all countries but Japan, where 3 × 6' panel sizes are standard. In most countries, for plywood under IHPA specifications, plywood mills will only produce on the basis of advance sales orders, whereas the market for plywood meeting JPIC specifications, the market is fairly wide.

Table 3

Main plywood thicknesses (in mm)

United States (IHPA standard)	Japan (JPIC standard)	Europe (B/S standard)
2.7	3.0	
5.2		4.0
5.5		6.0
9.0	9.0	9.0
12.0	12.0	12.0
15.0	15.0	15.0
18.0	18.0	18.0

Source: information provided by H+C Venture-Trade Pte Ltd., Singapore

with buyers from Japan, the Middle East, China (including Hong Kong), Republic of Korea and Taiwan Province of China. B/S specifications only apply to the European market, where plywood is normally produced to order, the more so as European buyers tend to insist on homogeneous plywood, made from the same type of timber. As the slightly higher prices for B/S grade plywood do not make up for the higher production costs of finishing both faces rather than just one, many Malaysian producers are having problems in producing according to these specifications.

C. Threats to the role of tropical plywood

28. The role of tropical plywood in the wood-based panels sector is under threat from two sides: problems in the supply of the raw material (tropical timber), and the use of other wood-based panels. The latter is partly the result of environmental pressures: there is a trend in many Western countries to stop the use of tropical hardwood with a view to reducing the pressure on the tropical rain forest; exporting countries have been somewhat slow to react to this, although certificates of sustainable forest exploitation have now been introduced. It is also price-driven: some of the other wood-based panels, in particular those using the recently developed OSB and MDF, are much cheaper.

29. Indonesia, the dominant exporter, is facing growing difficulties as a result of a decline in log supplies. The rapid growth of the Indonesian plywood industry increased pressure on forests, leading the Government to declare the plywood industry closed to new investments, and to introduce tighter controls on forest exploitation. Increases in log prices, meanwhile, put pressure on many of the plywood manufacturers. The situation in Malaysia is not much better. In both countries, frequent disruptions of log supplies and labour shortages have in recent years led to the repeated interruption of many plant operations.

30. In Malaysia, log availability in the coming years is likely to fall by at least one third, after already having declined, from 1990 to 1995, by 27 per cent in Peninsular Malaysia, 25 per cent in Sabah and 13 per cent in Sarawak. Currently, logging levels in Sabah and especially Sarawak are far above the sustainable level (in Sarawak, 16 million m^3, compared to a sustainable level of 9.2 million m^3), with most of the difference coming from logging in so-called "conversion forest", that is, forest earmarked for other uses (such as urban development or agriculture). Logging in conversion forest is a one-off affair - the land can only be cleared once. Relatively little conversion forest is still available, so production is likely to fall to a sustainable level soon. The same is true in Sabah, where full use of the production capacity of primary processing mills (sawmills, plywood and veneer mills, blockboard mills, particle board mills and pulp mills) would require a yearly log input of 15.8 million m^3, while the sustainable production level is only 6 million m^3. As sawnwood mills account for more than 60 per cent of this capacity, they are likely to be most affected by the scarcity of logs, but plywood mills will also be affected.[3] As for Indonesia, a World Bank report estimated that its sustainable log production is 22 million m^3, compared to current levels of 40 million m^3. Again, much of the difference is made up by conversion forest, but unless significant timber plantations are productive in time, plywood production is likely to decline quite strongly (taking into account also that the pulp and paper industry in the region is growing fast, and will require more plantations).

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[3] Sabah Timber Industries Association, *Restructuring Sabah's Timber Industry: Problems, Strategies and Implications*, 28 February 1997.

31. Log quality supply is also deteriorating: logs are of smaller diameter, and of less desirable species. Plywood mills have responded to this by installing the capacity to peel smaller logs (whereas in the past a 7-inch core was left, most mills are now able to peel up to a 3-inch core), and by investigating the possibility of using non-traditional species. Nevertheless, these are stopgap measures, and will not be sufficient to counterbalance the decline in log supply.

32. Log prices are therefore likely to increase. Other costs are also likely to increase, in particularly labour costs - and plywood production is labour intensive, as all output needs to be visually checked. Although the sawnwood industry is likely to be the most affected, some plywood mills are likely to be closed.

33. After their past problems with log supplies, many Japanese plywood manufacturers have retooled their factories to use softwood rather than hardwood logs in plywood production. Obviously this also means they are promoting this softwood plywood among their customers, carrying out research and adapting their products in order to capture a part of the hardwood plywood market. So while, in the short run, the closure or conversion of many Japanese tropical plywood producers may mean a larger market for tropical plywood exporters from South-East Asia, in the longer run, this is likely to be moderated by a shift in the structure of demand. Many importers are also trying to convince their buyers to shift to softwood plywood, as they find the supply of hardwood plywood to be unreliable, in terms of both physical availability and stability of price. The Japan Plywood Manufacturers' Association has even set targets for the replacement of hardwood logs by softwood logs.

34. One result of the problems in log supply is that in quite a few cases it is difficult for plywood producers to deliver just-in-time. On-time delivery is very important, as most of the importers do not really wish to hold stocks, because of the cost involved, the frequent fluctuations in demand and foreign exchange rates, and the easy availability of supplies. As a result, exporting countries need to be able to follow the market trends closely and to negotiate appropriate delivery schedules, something which has caused more problems for tropical plywood exporters than for sellers of softwood plywood or MDF or OSB.

35. It is estimated that the worldwide consumption of wood-based panels will double from 1993 to 2010. Most of this increased demand is likely to be met by increasing the production of MDF and OSB. During the last few years, a number of new plants producing MDF have gone into operation especially in South East-Asia. The increase in capacity led to a fall in sales prices from around US$ 350 per m^3 in 1994 to US$ 180 per m^3 in 1996, which clearly led to the replacement of plywood as well as hardwood lumber in a number of joinery and furniture applications, and which forced plywood prices to adjust in order to meet the competition.

36. Japanese companies importing plywood are heavily involved in the investments in MDF factories. Marubeni, for instance, is one of the joint-venture partners in a large venture in Malaysia, with much of the 200,000 m^3 production capacity destined for the Japanese market. Nissho Iwai is involved in another venture, with a production capacity of 100,000 m^3. In Japan itself, MDF production is increasing rapidly, with 27 per cent growth in 1996. Major traditional importers of tropical plywood are thus increasingly become stakeholders in the growth of the plywood substitutes sector.

D. International trade

37. Although plywood accounts for only somewhat over one-third of woodbased panels production, it accounts for virtually all international trade in woodbased panels. Tropical plywood, in turn, accounts for about three quarters of international plywood trade.

38. International trade in tropical plywood is worth US$ 6 billion a year, more than twice the value of the world market in tropical logs. Indonesia and Malaysia are responsible for almost 90 per cent of worldwide exports. In 1994, with a share of close to 65 per cent, Indonesia earned over US$ 3.7 billion from plywood exports; Malaysia exported plywood worth more than US$ 1.3 billion. Production is also important in Latin America and Africa, but countries in those regions tend to be less export-oriented: in 1993, the Asian region utilized 15 per cent of its total production of 14.4 million m^3 domestically, compared to 65 per cent for Latin America (of a total production of 2 million m^3) and 72 per cent for Africa (of a total production of 158,000 m^3). Table 4 shows the major trade flows.

Table 4

Major trade flows for tropical plywood, 1995

Importer	Imports (in thousands of m^3) from			
	Indonesia	Malaysia	Brazil	Others
Japan	3 035	969	10	34
China	1 107	798	0	158
Republic of Korea	742	379	-	38
Taiwan Province of China	798	126	-	11
European Union	404	83	283	572
United States of America	678	127	76	39
Others	1 443	529	577	287

Source: International Tropical Timber Organization, *Annual Review and Assessment of the World Tropical Timber Situation*, 1996. Note that information on trade flows is very inconsistent. Here, data from importers are used, but, for example, while Japan reported imports of just over 3 million m^3 from Indonesia, Indonesia reported exports to Japan of 3.5 million m^3.

39. Over the last decade Indonesia has dominated the world market, and plywood is the country's major non-oil foreign-exchange earner. Until the early 1980s, Indonesia's exports of forestry products almost exclusively of raw logs, which were supplied to sawmills and plywood factories in Taiwan Province of China, the Republic of Korea and Japan. The Government then introduced restrictions on such exports, and in 1985 banned them completely for a short period, a ban that was later replaced by a system of high export taxes on raw logs. In 1986, Indonesia imposed a quota system on the export of plywood, and introduced a cross-subsidy system

between traditional and non-traditional markets.[4] At that time, the world's plywood market was effectively controlled by the buyers. With the new strategy, the market gradually changed to a seller's market and the price of plywood went up. In its marketing strategy, Indonesia's association of plywood mills, Apkindo, often ensures that its members export less than the amount demanded by export markets, with the aim of keeping plywood prices high. However, this strategy may not be effective in the future. New plywood exporters have entered the arena (including Malaysian companies), and major investments have been made in the development of alternative wood-based panels, which now pose a threat to the tropical plywood market.

39. In recent years, Indonesia's plywood exports have been are losing shares in the world market. The proportion of Indonesian plywood exports to other Asian countries (primarily Japan, the Republic of Korea and China) fell from 79 per cent to 64 per cent between 1991 and 1994. Given the decrease in plywood exports and export earnings, and the emergence of new potential competitors, the Indonesian Government is reviewing its plywood marketing and promotion policies. An alternative risk management mechanism such as a plywood exchange could merit serious consideration.

40. Malaysia is Indonesia's major competitor in the tropical plywood trade. Its exports increased by 24 per cent and 30 per cent in 1994 and 1995, respectively. Indonesia share of world tropical plywood exports declined from 84 per cent in 1991 to 65 per cent in 1995, while Malaysia's share rose from 11 per cent in 1991 to 29 per cent in 1995. This rapid growth was due to the construction of new plywood mills in Sabah and Sarawak to process peeler logs which would formerly have been exported; as can be seen in table 5, Sabah, whose producers concentrate on China and the Republic of Korea, and Sarawak, which exports almost half of its total production to Japan, are now the country's largest plywood-exporting regions.

Table 5

Malaysia: export of plywood by State and by destination
(thousands of m^3, January-August 1996)

	China/ Republic of Korea	Japan	Other Asian countries	Other destinations
Peninsular Malaysia	10	71	123	48
Sabah	469	260	309	69
Sarawak	259	565	215	166

Source: Data Malaysian Panel Manufacturers' Association

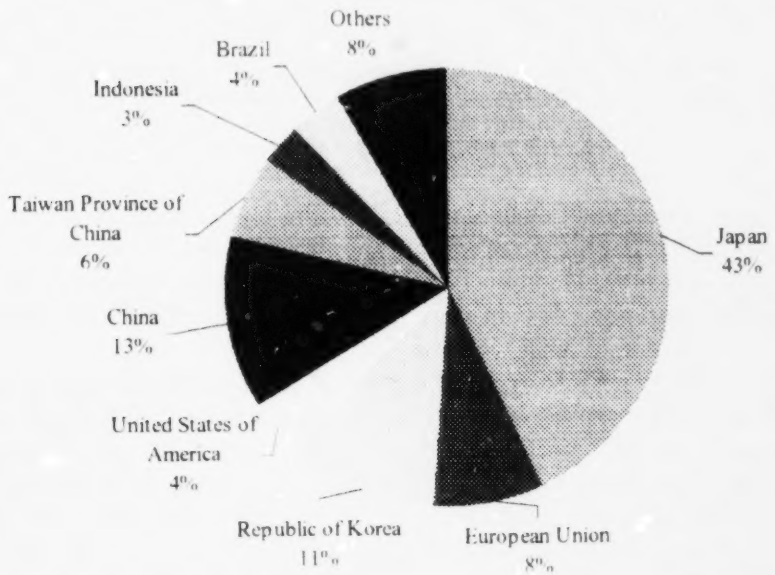
[4] Generally, the export quota system is applied with regard to traditional markets such as the United States, the United Kingdom, the European Union and Australia. The non-quota markets are represented mainly by China (including Hong Kong), Japan and the Republic of Korea.

41. The third largest exporter of plywood is Brazil. Its plywood exports have been stagnating over recent years; they peaked at 726,000 m^3 in 1994, but then declined to 550,000 m^3 in 1996. This decline was largely due to the large increase in domestic consumption. Production in the other traditional plywood-exporting countries (China and Taiwan Province of China, India, Philippines, and Thailand) is either falling or stable, and as their internal demand generally continues to increase, most of these countries have become net importers.

42. As shown in figures 2 and 3, Japan remains by far the largest consumer and importer of tropical plywood, absorbing almost 7.7 million m^3 in 1996; of this, only 3.3 million m^3 was produced locally, from imported logs (in Japan, domestic production of tropical plywood as well as imports of tropical logs declined by almost 40 per cent from 1992 to 1996, while imports of tropical plywood increased by more than 50 per cent). China and Taiwan Province of China, and the Republic of Korea are other major importers. The United States and the European Union (mainly the United Kingdom, France and the Netherlands) are also importers of tropical plywood. The consumption of tropical plywood in the European Union is influenced by many factors, including its capacity to produce alternative building materials such as other wood-based panels or solid timber.

Figure 2

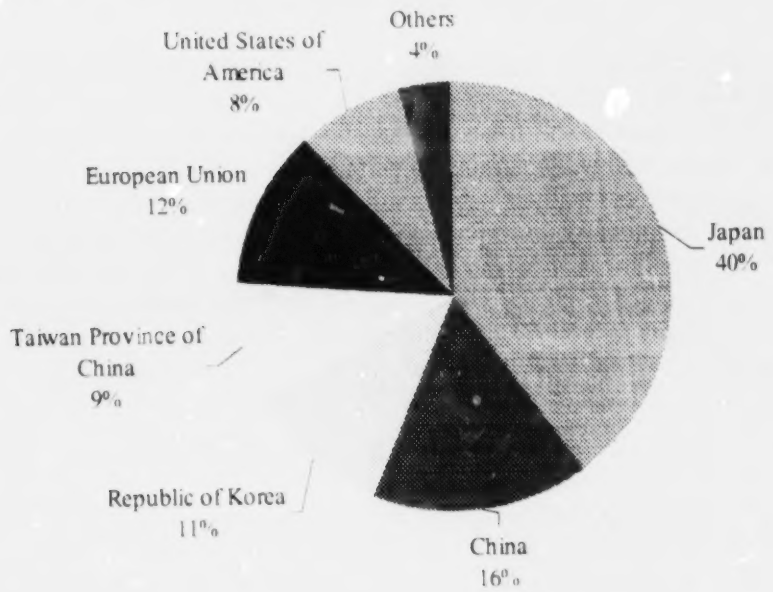
Consumption of tropical plywood, 1996
(members of the International Tropical Association only)



Source: International Timber Organization, *Annual review and Assessment of the World Tropical Timber Situation*, 1996

Figure 3

Tropical plywood imports, 1996
(members of the International Timber Association only)



Source: International Timber Organization, *Annual review and Assessment of the World Tropical Timber Situation*, 1996

43. China's future imports are difficult to predict. With a rapidly developing economy and steadily rising living standards, production and consumption of plywood have been increasing year by year. In 1994, local plywood production was 2.6 million m^3, compared to imports of 2 million m^3 (mostly of tropical plywood). In 1996, total plywood production was estimated to be 7.6 million m^3 (the production of other wood-based panels had also tripled). There are now more than 500 plywood mills in China, many of them relatively small and owned by municipal authorities or small private enterprises; the traditional, large state-owned industry has lost most of its market share in the face of competition. The mills have established links with overseas log suppliers, buying from Southern and Central Africa, Papua New Guinea, the Solomon Islands and Sabah; they also process veneers imported from Cambodia and Sabah. The strong growth in plywood producing capacity in China has led to lower imports, but imports may pick up again as a result of the country's continuing economic growth and the steadily increasing difficulty of obtaining raw logs. Imports of logs and veneers, rather than plywood, are stimulated by China's import policy. As shown in table 6, there is a 20-per-cent import duty and a 17-per-cent value added tax on plywood, while for logs and veneers the import duty is minimal; through its import licensing system, China has also introduced some non-tariff barriers on plywood imports.

44. In setting delivery specifications and locations, tariffs and rules of origin need to be taken into account (see table 6). For example, if plywood from country *x* can enter the main market at a zero tariff, while for plywood from country *y* a 10-per-cent tariff has to be paid, then plywood from country *x* clearly has an advantage over that from country *y*, and this difference should be reflected in the delivery specifications. Tariffs on finished wood products have declined in recent years following the Uruguay Round agreements and the establishment of the World Trade organization (WTO). For example, the complicated European Union Generalized System of Preferences (GSP) quota scheme for tropical plywood was replaced in 1995 by a straight import tariff. Duty on imports of tropical plywood and doors is charged at 70 per cent of the full tariff rate in each country, while other primary products are duty-free.

Table 6

Plywood Trade Barriers for Major Consumers Countries, 1995.

Country	Description
Canada	1-8% import tariff, depending on species and country
China	20% import tax, 17% value-added tax
European Union France Netherlands Portugal United Kingdom	 10% (except waivers under GSP, Lomé) 10% import tariff, depending on species None 9.4-10%, depending on species
Japan	Tariff base rate 10-15% (lower for GSP imports), to be reduced to 8.5-10% by 1999
New Zealand	None
Norway	None
Republic of Korea	8% import tariff
U.S.	None (GSP scheme)

Source: ITTO *Annual Review and Assessment of the World Tropical Timber Situation*, 1996

45. It should be noted that wood products from Malaysia are being graduated from the European Union GSP, as from 1 January 1998, and from the United States GSP as from 1 January 1997. This will have an impact on the f.o.b. value of Malaysian wood products as compared to Indonesian ones, at least as far as exports to these two markets are concerned. The impact on the delivery specifications of a new international futures contract for tropical plywood is likely to be small, considering that, as discussed below, thin plywood is proposed as the standard for this contract, while exports to these two markets are basically of thicker plywoods. Nevertheless, this issue merits further consideration.

Chapter II

PRICE BEHAVIOUR

A. Price trends

46. The general reference for tropical plywood prices is the price lists issued by trade associations: Indonesia's Apkindo has produced INDO 96, to replace the old INDO 93; Malaysia's M96 replaces the old M88 ; and Brazil replaced its old price-structure guidelines with the K14 and BR 96 lists. The new INDO 96, M96 and BR 96, shown in table 7, are set at a higher levels than the previous references. In physical trade, prices are often quoted as per the list plus a given percentage (e.g. M96 plus 9 per cent).

47. Indonesia and Malaysia have made an effort since 1995 to push prices to higher levels, initially without much success. In March 1996, they started to determine with some regularity (with a meeting approximately every three months) minimum export prices and/or target prices for some types of plywood sold to China and the Republic of Korea; they also determine export quotas. Prices basically follow market price levels; the Shanghai Commodity Exchange plywood price is taken as an important indicator (in other words, although in the very short term the prices may be stabilized, the price-stabilizing effect of this agreement on prices over a period of several months is doubtful). Although this is a "gentlemen's agreement", it does carry some weigh; for example, in Sabah, the Sabah Timber Industry Association, which has to approve all export contracts, is not supposed to approve any contracts at prices below these indicative prices. Although some contracts are signed at prices higher than the indicative price, most are at this price; a reasonable number are signed at prices lower than the agreed minimum price, the usual argument being that qualities are below average (at times a somewhat dubious claim). Export quotas are also set in the agreement but, as they correspond quite closely to actual delivery potential, they are not monitored.

Table 7

Base price list for ordinary quality ("MR") plywood, BB/CC specifications, c.i.f. European ports, US$ per m^3

	M96	INDO 96	BR 96
3.0 mm	544	534	-
3.6 mm	499	489	-
4.0 mm	478	469	479
5.0 mm	454	445	-
5.5 mm	447	438	-
6.0 mm	440	432	441
8.0 mm	436	424	-
9.0 mm	427	420	429
10.0 mm	416	410	-
12.0 mm	404	405	414
15.0 mm	411	408	417
18.0 mm	396	400	408
22.0 mm	407	400	408
25.0 mm	400	400	408

48. There is not much reliable information about plywood prices in actual transactions. As mentioned above, prices are often given in relation to the listed prices. However, the prices at which trade actually takes place are not registered publicly. Rather, public price quotations depend on informal surveys of buyers and sellers. These informal surveys are

normally held among a fairly small group of companies, and the basis for price estimates is not identical from month to month. For instance, if in one month one has price quotations for three exporters from Peninsular Malaysia and three from Sabah and Sarawak, the reported price evidently gives a weight of 50 percent to the quotations from Peninsular Malaysia. If in the following month, there is one price quotation from Peninsular Malaysia and nine from Sabah and Sarawak, in the resulting reported price the weight for the quotation from Peninsular Malaysia is only 10 per cent. This clearly can have an impact on the level of quoted prices. In addition, price quotations may not always reflect actual trade prices; for example, buyers may benefit from "quality discounts", which vary depending on the market situation.

50. Figure 4 gives an impression of price developments for Indonesian 3 mm plywood exported to Japan - the single largest uniform flow of plywood. As can be noted, plywood prices in the period from April 1992 to June 1996 varied from US$ 400 per m^3 to US$ 780 per m^3. Price trends for Indonesian exports to Europe, and for Malaysian exports to Japan and to Europe, were similar. Export prices from Indonesia and Malaysia to China are in theory revised only once every three months, and are stable in the meantime; in practice, varying discounts and other factors do create some price instability. Malaysian 3 mm plywood sells at a discount of US$ 20 compared to Indonesian 3 mm plywood, the same discount as that applied on delivery to the Shanghai Commodity Exchange. The reason for this is not clear, but it may have to do with the fact that Malaysia is a more recent entrant in the Chinese market, and has had to sell at a discount to gain a market share (in the bilateral Malaysian/Indonesian Plywood Consultative Meetings, no difference in terms of the prices to be realized is made between the two origins of plywood).

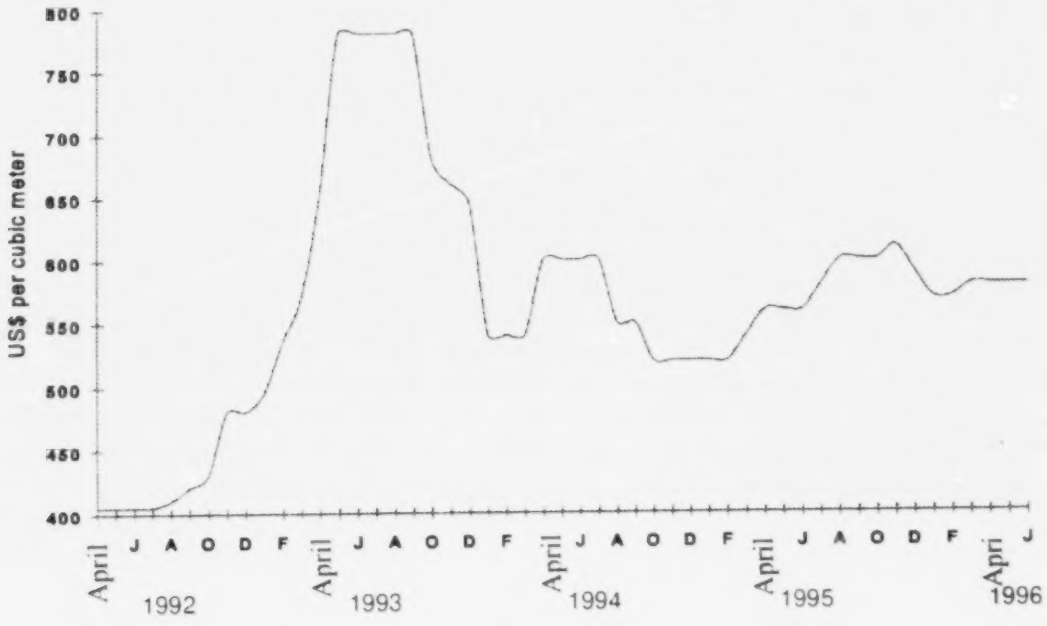
B. Price volatility

51. Compared to other commodities, plywood prices are reasonably stable. From month to month, real price changes are generally in the 2-3 per cent range (quoted prices often remain stable). However, occasionally, price changes in the 10-per-cent range do occur; and considering the small profit margins of plywood producers (and the fact that they are really processors, exposed to price risk both at the input and the output ends), even small price changes can be detrimental. Overall, the instability index of tropical plywood prices is higher than that of many exchange-traded commodities, including vegetable oils and most metals (instability indices are measured as the average percentage deviation of average monthly prices from their exponential trend level for a given period).

52. Quoted prices often remain stable for a period of four to six months, but then often change radically from one month to the next. In practice, according to industry sources, real prices move more smoothly, and changes in quoted prices are likely to follow real price developments, rather than the other way round. Table 8 gives an impression of the frequency of small and large price changes from one month to the next, and, to capture better the real price changes, from one month to six months later.

Figure 4

Plywood prices for Indonesian 3mm plywood, cost & freight Japanese ports



Source: International Tropical Timber Organization

Table 8

Frequency distribution of tropical plywood price changes (for Indonesian 3 mm plywood, C&F Japanese ports) from one month to the next, and from one month to six months later, April 1992 to June 1996

Percentage price change	0 %	0-5%	5-10%	10-15%	15-20%	> 20 %
Compared to previous months						
Frequency of price increases	52 %	20 %	4 %	6 %		2 %
Frequency of price decreases		10 %	2 %	4 %		
Compared to six months earlier						
Frequency of price increases		2 %	18%	5 %	7 %	25 %
Frequency of price decreases		9 %	11 %	14 %	5 %	7 %

Source: based on data provided by the International Tropical Timber Organization

49. As can be seen in table 8, quoted prices remained stable from one month to the next in more than half the cases. In another 30 per cent of cases, they changed by less than 5 per cent. But, as noted, this probably hides more frequent real price changes. The second part of the table, where quoted prices are compared with the quoted prices six months earlier, shows that prices differed by less than 10 per cent from those quoted six months only 40 per cent of the time earlier. One third of the time, prices differed by 20 per cent or more.

50. Such variations can, of course, be to the benefit of the producers. However, a 20-per-cent price decline over a six month period will have a major impact on cash flow and, unless the plywood company has large financial reserves or easy access to bank finance, on its possibility to fund its operations and planned investments.

51. Price instability would appear to be a fairly common problem in the plywood industry. It is not limited to a few exporters, but is faced by all exporters and also by importers and end users. For instance, in Japan, prices of plywood sheets, in yen, are rarely stable for periods of over one month. A quarter of the time, prices vary by more than 4 per cent from one month to the next. If one compares prices in one month with the prices three months earlier, in over half the cases the price difference is higher than 5 per cent, and in over a quarter of the cases it is higher than 10 per cent. Price variations do not seem to be related to the quality or the thickness of plywood: if anything, price quotations for more specialized plywood thicknesses appear less stable than those for 3 mm plywood.

52. Will price volatility increase with the introduction of a plywood futures contract? Most studies on futures markets agree on two results of futures market trade firstly, futures markets smooth out seasonal price movements, by allowing firms and speculators to shift part of their demand or supply forward. So, medium- and long-term volatility is lower. Secondly, futures markets allow a faster adjustment to changing conditions in the physical market. While without a futures market it may take, say, a week for prices to reach their new equilibrium level following a supply or demand shock, with a futures market this can be a matter of a day or even less than an hour. Because of the speed of this response, the market often "overshoots", moving first too much in a certain direction, and then correcting itself. This means, of course, that short-term volatility is much higher with a futures market than without one (this is the price for a much better price adjustment to changing market conditions). Naive users of a futures market can indeed suffer financial losses due to this volatility, but with some training effort such losses can easily be avoided.

53. Futures markets do make market conditions transparent. If price volatility in a market is invisible (perhaps because it takes the form of volatile premiums and discounts on a listed price), it becomes visible in a futures market. In such a case, however, the futures market does not create the volatility, but only makes it visible. The only case in which a futures market creates volatility is when it attracts a speculative public which by far outweighs the hedging community; such is the case in China, but, so far, it is very rare in other countries. As long as speculators (and gamblers) have other outlets for their speculative urges, it is unlikely that they will swamp those with an underlying interest in the commodity market. Rather, they will make up a healthy part of the market, contributing to its liquidity and development without distorting its price discovery function.

C. Market integration

54. A commodity futures exchange trades "paper", not physical commodities. This paper, the futures contracts, nominally represents a certain quantity and grade, or grades, of the commodity, but this not prevent those producing or consuming other grades from using the exchange. What does matter is that the price behaviour of the grades one produces, or deals in, is similar to the price behaviour of the grade or grades underlying the futures contract. In other words, if the futures contract is nominally for 3 mm plywood for the Japanese or Chinese markets, it can still be used by exporters of, say, 12 mm plywood to Europe as long as the prices of the two products move in parallel.

55. A proper analysis of price correlations between different thicknesses, sides, grades and destinations of plywood is greatly hindered by the lack of good price data, as mentioned above. Since 1994, the International Trade Centre UNCTAD/WTO has been making efforts to collect price data, a task taken over in 1996 by the International Tropical Timber Organization. However, price series are not systematic, and price data are at best available at fortnightly intervals, rather than daily. Even in the case of fortnightly data, there are gaps; in a number of cases, price ranges rather than absolute prices are given, and the underlying transactions are not necessarily representative (for example, a certain quote may reflect the price of a single sale). Nevertheless, when corroborated by interviews with industry players, the data allow a few observations to be made.

56. The correlation between Malaysian and Indonesian export prices is good. For a given grade, the absolute price difference is determined largely by transport cost differentials; and for the main markets in Asia, transport costs account for only 5-10 per cent of the cost and freight price of plywood. So a futures contract in either of the countries would reflect the export prices of the other country quite closely. Plywood exporters from Brazil compete with Indonesian exporters on the European markets, selling at a price around 5 per cent below Indonesian levels. One can therefore expect a reasonably good correlation between Brazilian and Indonesian plywood prices, and hence their is a clear possibility that a South-East Asian plywood futures market would also serve the interests of the Brazilian plywood industry.

58. With regard to different thicknesses, market participants make two observations. Firstly, some forms of plywood have a price behaviour that is unique; this is the case for certain "insert" items (plywood only made on order), and for plywood thicker than 12 mm. Secondly, for most plywood between 2.7 and 12 mm, price behaviour appears fairly homogeneous and, in any case, absolute price changes are almost always larger than the changes in price differences between one thickness of plywood and another. These plywoods account for the greater part of total plywood production.

57. A calculation of the price correlation between various thicknesses is unfortunately impossible for the countries of origin. Data have only been collected for 1996 and the beginning of 1997, a period of very stable prices and one for which a correlation analysis is not very useful. As for C&F prices for Indonesian plywood in Japan, in the period April 1992 to October 1996, the correlation of monthly prices of 12 mm floor-base plywood and thin (less than 3 mm) panel was 96 per cent. The correlation between C&F prices and f.o.b. prices would appear to be good: transport costs are fairly stable, and well-known to all market participants.

58. Apart from certain high-quality finishes, it seems to make little difference, in terms of price behaviour, what type of glue is used, what the panel size is (4 × 8' or 3 × 6'), or whether the plywood is finished according to JPIC, IHPA or B/S specifications (although absolute price levels are affected of course).

59. In summary, the market segmentation for tropical plywood does not seem as strong as one might have expected, taking into account the very large range of types of plywood produced. The major part of the plywood market is fairly well integrated, with prices which move similarly across the broad plywood categories and markets. Nevertheless, if a plywood futures market was established, every potential user would benefit from comparing prices over previous years with the reference prices for the physical commodity underlying the futures market. To facilitate this, the exchange would have to provide good, consistent data on the average prices realized over recent years in the different ports where physical delivery is allowed. To achieve this, additional research would be required.

60. One might hope that a tropical plywood futures contract would also be relevant for other types of wood panels. For example, although MDF still does not have the structural strength of plywood, it does compete with plywood in certain applications. At first sight, it would appear that MDF and plywood prices are correlated: if plywood prices are high, furniture manufacturers shift to MDF (causing MDF prices to increase), shifting back when plywood prices fall again. However, a more formal analysis (using price data not available in the framework of this study) would be required to verify this. Similarly, it would be useful to evaluate the price correlation between softwood plywood and tropical plywood. If this correlation is reasonable (over 70 per cent), there would be interesting possibilities for arbitrage which would add to the liquidity of the market.

Chapter III

INDUSTRY AND MARKET STRUCTURE

A. Industry structure

61. Compared to the thousands of sawmills installed worldwide, there are relatively few mills producing tropical plywood. The main reason for this is the high investment cost, which can amount to over US$ 10 million for a production line producing ordinary plywood (the average mill has only one to three production lines). Still, over 200,000 people are directly employed by these plywood mills, and many more are active in related log production (in Indonesia alone, around 1.6 million people are employed in the forestry sector).

62. The greatest concentration of tropical plywood mills is in South-East and East Asia. China probably has the largest number of mills, but in terms of total capacity, Indonesia dominates. The country currently has 119 plywood mills (compared to 29 in 1980) with a total capacity of 10 million m^3 per year; 13 of these mills produce fancy plywood, PVC-covered plywood and other specialized products, while the other 106 concentrate on ordinary plywood. Many of these mills are concentrated in groups, the largest of which is the Barito Pacific Group, the biggest timber business group in the country, with operations ranging from logging to the production of adhesives. With nine mills and a total production capacity of around 1.28 million m^3 per year, the group accounts for 12 per cent of Indonesia's total production capacity. Still, one cannot really say that production capacity, is dominated by only a few groups. The five largest groups account for only one third of total production capacity, the ten largest groups for less than half.

Table 9

Indonesia: plywood industry structure
(1996 production capacity, ordinary plywood, 000 m^3)

	Number of mills	Production capacity (000 m^3)	Share in total Indonesian production capacity
Barito Pacific	9	1 280	12 %
KLI Group	2	720	7 %
Korindo Group	6	592	5 %
Kalimanis Group	6	465	4 %
Djayanti Group	2	463	4 %
Next five largest groups	14	1 354	12 %
Other plywood companies	67	6 140	56 %

Source: Based on data provided by the Indonesian Association of Panel Producers (Apkindo). Mills producing only fancy plywood are excluded.

63. Industry concentration is an important consideration, since there is a possibility that an exchange will be abused by one large players, or by a group of market player acting in collusion. It can be said that no Indonesian company is, by itself, large enough to be able to manipulate a plywood futures contract; and even if the ten largest groups were to act in collusion, their total market share would not suffice to give them real control over the market (note that an aluminium futures contract was successfully introduced when seven large, vertically integrated aluminium firms still controlled about half of the world aluminium market - the half of the market which they did not control was sufficiently competitive to ensure a well-functioning futures market). The fact that, in Indonesia, Apkindo determines the plywood export quota for each mill (quotas that are then endorsed by the Directorate General of Overseas Trade) does not mean it could in fact act as one company.

64. Firms in Malaysia are small compared to their Indonesian counterparts. Table 10 gives an impression of the industry structure in Sabah. The largest group, the Sabah Foundation (with three mills) is owned by the State, and accounts for somewhat over one tenth of total production. All other companies run individual mills, with market shares that do not exceed 7 per cent. In Sarawak, some firms are larger, but, their total share of the world tropical plywood market is small.

Table 10

Largest 10 plywood producers in Sabah: production, and share of total (1995)

Name of mill	Production volume (thousands of m^3)	Share of total production
Focus Lumber	94	7 %
Million Veneers and Plywood	78	6 %
Sinora [a)]	77	6 %
Veracity Corporation	70	5 %
Parakaya Plywood	69	5 %
Aokam Industries	65	5 %
Pacific Hardwood [a)]	55	4 %
Kalabakan Plywood	55	4 %
Khaspermata	55	4 %
UNP Plywood	54	4 %
Total of mills ranked 11 to 20	458	33 %
Total of other 22 active mills	239	17 %
Total plywood production, in Sabah	**1 369**	

Source: Sabah Forestry Department

[a)] Part of the Sabah Foundation (owned by the State of Sabah), which operates three plywood mills

65. In addition, there is a large number of mills capable of producing tropical plywood in Japan and China, and end-users have the possibility of shifting to substitutes when prices become high.

66. In conclusion, although the number of plywood mills is quite small, none of them really dominates the market. Rather, there are a few dozen companies which are all relatively large. The fact that the tropical plywood market does not function in a vacuum, but, is exposed to competitive pressure from softwood plywood and other wood-based panels, makes it even less likely that any large companies, whether acting alone or in conjunction, would be able to manipulate a futures market. One should also note that if a certain group of companies were in a position to manipulate the futures market, they would already be manipulating the physical market, which would be easier and less visible. From the development of plywood prices, it should be clear that no such group has been active, or at least effective, in unilaterally setting prices. The industry structure would therefore appear to pose no obstacle to the introduction of a plywood futures market.

B. Distribution channels

67. The normal trade channels in international plywood trade consists of:

- Direct contract sales to overseas customers, often through sales offices or agents;
- Sales to traders, predominantly based in Singapore and Hong Kong Special Administrative Region of China;
- Sales to representatives of overseas companies who are buying directly at origin.

68. Direct contract sales to customers based in the importing countries are still the main form of trade, although this is changing. Indonesia's Apkindo has associated trading firms with offices in many markets (China, Egypt, Hong Kong, Japan, Singapore and Taiwan (Province of China). Malaysian firms also have overseas representative offices. Where they do not have offices, they sell through agents (the normal form of sales in Europe). While Malaysia's firms all take care of their own marketing, Indonesian mills act collectively, through the firms associated to Apkindo. To some extent, the results of the Indonesian policy have not been very satisfactory; in fact it has reduced the opportunities for Indonesian plywood exporters to develop their own markets. Nevertheless, sales companies such as the ones linked to Apkindo could act as a perfect vehicle for getting domestic players in the consumer markets to make (indirect) use of a futures exchange.

69. Sales to traders form a reasonably important market segment, accounting for 20 per cent of Malaysia's exports and between 5 and 10 per cent of Indonesia's exports. Traders play an important role in mitigating credit risk (they are often used when mills want to sell to relatively risky markets), and they also fulfil, at times, an important storage function, buying stock from mills when these have problems finding buyers (the mills' storage capacity and, perhaps more importantly, their financing capacity are limited).

70. An important new trend in the market is that some end-users, such as large construction firms and large furniture manufacturers (from Japan as well as Europe), are making an effort to bypass the traditional importing firms. This should provide important additional flexibility to plywood mills in the years to come, and would make the introduction of a futures contract easier.

71. In Japan, the general and specialized trading houses play a central role in the distribution of all imported and domestic panel products (they buy around 70 per cent of domestic and imported panels). They in turn supply about 95 per cent of the panel products they buy to wholesalers for secondary processing and redistribution (only small quantities are supplied directly from wholesalers to end-users). It is important to note that the trading houses control the supply of credit and finance to their customers (wholesalers, merchant retailers and end-users).

72. Unlike Japan, with its many layers of wholesaling and retailing of wood products, the United States has a pattern of direct supply to the end-user. Distribution is not always carried out directly from the mill, but often through the producers' fully owned distribution networks (most of the large panel manufacturers have set up their own networks of warehouses from which distribution is organized). For imported hardwood plywood, large manufacturers (furniture manufacturers) will frequently buy direct for all or part of their requirements, otherwise they deal through regular agents and brokers.

73. With the exception of Japan, most of those active in the distribution chain, especially at the level of wholesalers and importers, tend to be dependent on wood products for a large part of their turnover. As they carry inventories, and as there is active competition in most regions, they may be interested in price risk management tools. However, in most cases their interest would probably be expressed indirectly, with the exporter or the wholesaler offering a new way of pricing the product.

C. Marketing practices

74. Many of the trade links in the international plywood trade are longstanding. Mills have a reasonable idea of how much a certain buyer or agent will ask in for a certain month, and they expect him to notify the mill in time if the actual purchase will differ significantly from that. Even though these are not written obligations, they are very real, and plywood mills will always make an effort to fulfil these obligations. The prices in these informal contracts are market-dependent, and are converted into a fixed price only at the moment when the actual sales contract is negotiated.

75. Forward contracting is common. At the very least, a mill will have contracted forward 80 per cent of the following month's expected production, 60 per cent of expected production for the month after that, and 40-50 per cent for the subsequent month; some mills go further (up to six months), but many do not. Flexibility is retained because of the uncertainty of production (the plant may have technical problems, and sufficient logs of the right types need to be procured, since only certain types of log will do for the faces), not because it allows the mills to benefit from market opportunities. Prices in forward contracts are fixed, normally being negotiated on the basis of current prices. In rare cases, prices are left open and determined only at delivery time, on the basis of the prices then prevailing. Buyers tend to buy on the basis of three-month forward contracts, although shorter-term purchases are becoming more common in the case of Japanese companies.

76. The traditional links between mills and many of their buyers imply that buyers are often unlikely to purchase on the open market unless a significant discount is offered. This makes it difficult for new suppliers, including those non-industry participants who would wish to take

delivery for resale to end-users if a futures market were to be created, to enter the market would wish. Even though some types of plywood may be common (5.2 mm plywood for sale to the United States, or 12 mm plywood for sale to Europe), that does not imply that an industry outsider could easily find a buyer for them. Only certain market segments have price-driven competition, the most important of which seems to be the market for 3 mm plywood in East Asia. In other words, if a futures contract based on physical delivery is to succeed, the underlying types of plywood must have a ready, price-competitive market, and from the preliminary research for this study it would appear that only 2.7 mm and 3 mm plywood falls into that category.

77. Marketing practices should also determine the standard size of a futures contract, with an upper limit determined by financial considerations (a futures contract should not be so large that small speculators are unable to use it). This standard size should be no larger than common traded quantities (for example, if plywood is normally traded by the container load, the futures contract may not be for more than one container load), and if it is smaller, it should be in such a trading unit that market participants can easily build up the positions needed (for example, if 15- ton containers are used, one cannot impose a 10-ton futures contract).

78. In international trade, contracts are normally for over 100 m^3, but not necessarily multiples of that. The plywood is generally packed into crates of 1.7-1.8 m^3, and prices are quoted in US$ per m^3. Obviously, the number of pieces of plywood is larger the thinner the plywood; one crate contains, for example, 200 pieces of 3 mm plywood, or 100 of 6 mm plywood. Only fancy, high-value plywood is generally shipped by container. Producers other than those in Peninsular Malaysia and Java would need to trans-ship containers, which would add to the cost (moreover, containers would need to be specially imported); therefore, most plywood crates are shipped in bulk. For smaller lots, transport can be difficult and expensive to arrange, but for quantities of 500 m^3 and more, shipment should not be a problem. All this, of course, means that it is not clear which delivery quantity best fits common marketing practices. This issue will be discussed further in chapter V.

Chapter IV

THE CASE FOR PRICE RISK MANAGEMENT

A. Price risk exposure

79. The tropical plywood industry exhibits several characteristics which would seem to indicate that it is indeed, exposed to the types of pressure that can be countered through the use of futures contracts, namely:

- Low profit margins;
- Short-term contracting practices for plywood sales ;
- The predominance of production-to-order;
- The prevalence of letter-of-credit conditions in international trade contracts.

80. In Indonesia and most regions of Malaysia (with the exception of Sarawak), the majority of mills are under pressure from rising log prices and relatively low plywood prices (which are partly the result of competition from cheaper substitutes such as OSB and MDF). Relatively small price declines, below the levels prevailing in early 1997, could eliminate most of their profits. The bottom line for their plywood operations is important to these companies: although often part of larger groups, most are independently registered companies which show little diversification outside the timber sector.

81. Logs account for around 50 per cent (in Sabah and Sarawak) to 60 per cent (in Peninsular Malaysia) or even 60-65 per cent (in Indonesia) of plywood production costs. If plywood prices decline, log prices may not react, for several reasons:

- There is a great demand for logs from the plywood industry in other countries, including Japan;
- The plywood industry normally has to compete hard to obtain logs, with most plywood mills operating at half capacity (only one shift instead of the two technically feasible) because of the difficulties in procuring raw material;
- The plywood industry has to compete with the sawnwood industry for logs.

In other words, when plywood prices decline, plywood mills cannot automatically pay lower prices to their log suppliers.

82. Plywood mills base their yearly budget on price forecasts; and in 1997 for instance, prices have so far been some 10 per cent below what many had expected. Exposure to price risk differs from company to company. For example: companies in Sabah and Sarawak have lower production costs than in Peninsular Malaysia. While in the latter, a fall of 2-3 per cent in prices would hit profits hard, in the former, a fall of 10-15 per cent would be necessary to cause real suffering. In Indonesia, companies are normally confronted with relatively high log costs, and are therefore quite vulnerable. On the other hand, a handful of companies in Sabah, two in Peninsular Malaysia and many in Sarawak and Indonesia (where plywood mills are often the result of vertical diversification by logging firms) own their own timber concessions, which, in Indonesia and Sarawak, are often large enough to provide all the timber they need. This acts to some extent as a cushion in the case of falls in the price of plywood. Some companies with production flexibility can shift to products with relatively higher prices, and a few companies can shift their entire production to LVL, a product with a price behaviour which is different from that of plywood.

83. Most plywood is sold one or two months forward, and sales are hardly ever for periods beyond three months forward. This hinders the capacity of mills to plan their production, that is, to determine which types of logs they need, procure these logs in time and at an acceptable price, and organize the logistics of production and transport in such a way that delivery is on time. The main reason for this lack of forward contracting seems to be price risk, that is, the difficulty in setting a forward price that is acceptable to both parties.

84. In Sabah, a number of mills specialize in 3 mm plywood. They try to optimize production, continuously producing even if they do not have any immediate buyers, and can have an unsold inventory of up to 5,000 m^3. Elsewhere the production of plywood which does not yet have a buyer is relatively rare, as reflected in very low plywood inventories at the producer level (despite the fact that plywood is easily storable). This is partly because mills prefer to have a contract before they start producing, since only in that way can they know which timber, resins and glue to use. Nevertheless, plywood mills often seem to be the victim of the delivery schedules requested by their buyers: they find it difficult to optimize their production pattern by producing longer runs of certain products for storage.

85. There are three main reasons for this: lack of sufficient storage capacity, financing costs and the price risks one takes on unsold plywood. High financing costs, as discussed below, are not untypical for industries which are not very transparent, and lack of price transparency is one of the components of this. Increasingly, plywood mills will be forced to produce for inventory, because they will need to make optimal use of their production capacity, and, because the many plywood mills involved in timber production have to keep their increasingly expensive log extracting machinery fully occupied (and as discussed earlier, logs should be processed as soon as possible after felling).

86. The predominant form of payment in the international plywood trade is letters of credit. This is a relatively expensive form of payment, but it is common when there is a serious risk of payment default. Payment defaults, in turn, can be the result of exposure to price risks (price changes encourage contracting parties who have not protected themselves against such changes to default).

87. However, contrary to the plywood producers, plywood buyers appear to be somewhat insulated from price risks. Indeed, with letter-of-credit conditions in contracts, they can easily negotiate a price discount if world market prices decline after signature of a fixed-price contract, since in practice, letters of credit very often have carry discrepancies: sellers do not have this luxury. Importers (and possibly also plywood producers in the main consuming country, Japan) seem to be able to pass on any cost increases to consumers. They also carry only a limited inventory, and do not enter into longer-term contracts with their clients.

88. Thus, the need for a price risk management tool (or the potential benefits of such a tool) seems to be largely restricted to the producers, especially those in developing countries. While in the long run it would appear to be in the interest of importers and end-users to keep the tropical plywood sector viable, they do not depend on this industry: many end-users have shifted to the use of softwood plywood and substitutes such as OSB and MDF, often encouraged by importers who not only find the supply of these alternatives more reliable, but also, in a number of cases, have invested in their production.

89. This is unfortunate, as a viable futures contract would require broad-based participation. To some extent, one can expect participation from the international traders based in Singapore and Hong Kong, from the Chinese trading houses, and from the plywood producers and plywood trading houses in Taiwan Province of China and the Republic of Korea. However, it would be preferable to draw in also the buyers from the world's largest importer, Japan. The best way to do this would be through a change in the pricing formulas used for physical trade, with a shift towards the use of futures market prices as a reference price, as further discussed below.

B. The utility of a futures market

90. A tropical plywood futures market would not be a panacea for all the problems of the tropical plywood sector. Difficulties in log supply, competition from softwood plywood and new substitutes, increasing labour costs, environmental concerns and the like would remain important challenges for the tropical plywood sector. But a futures market would allow it to cope with some of the problems relating to the marketing and pricing of tropical plywood, and thus allow senior management to concentrate on the wider challenges.

91. According to a number of surveys, among the major benefits of adopting a market-based price risk management programme are the general efficiency gains for the company resulting from better management. For example, a recent survey by KPMG found that, among banks which adopted such a risk management programme, a 55-per-cent increase in profits could be attributed to this new policy. Specifically:

- A 15-per-cent profit increase was made possible by improved asset-liabilities management;
- an 8-per-cent profit increase resulted from better use of resources;
- a 20-per-cent profit increase came from better margins on existing client business;
- a 10-per-cent profit increase resulted from the addition of new clients and new lines of business;
- and a further 2 per-cent profit increase resulted from various other factors.

92. Major benefits in terms of better operating and marketing efficiency could thus be expected if plywood companies were able to use a commodity futures market. The main disadvantage (apart from the effort needed to learn the new skills required for using the new instruments, and the facts that companies unwilling or unable to learn these new skills will lose competitiveness compared to others) is that greater price transparency may be a problem for some companies. The timber sector is traditionally not very transparent; pricing is considered to be proprietary company information, and some companies may think that this secrecy gives them the upper hand in contract negotiations (or in other aspects of their business). If one looks at actual price developments, this is somewhat doubtful; moreover, the real benefits of having access to a futures market more than outweigh any real or perceived benefits of having privileged access to price information. But old habits are often hard to change.

93. A fairly detailed, although still far from complete description of how a plywood futures market would work, and how it could be used, is given in the annex. Here, only a general description of the possible uses of a futures market is given.

94. An immediate benefit is that one can improve production logistics. Basically, with a futures market, one is able to optimize the use of the technical facilities of a plywood plant without

undue worry about the marketing of the plywood produced (as long as the plywood is of a fairly standard quality). This means that, rather than being driven by demand, production could be organized, for example, to maximize the operating hours of machinery, or to optimize the procurement of logs.

95. Inventories of both timber and plywood could also be better managed. The futures market would make it possible to "process" logs into plywood even before the actual processing took place; and the stocks of real and "virtual" plywood (that is, the logs) could be protected against the risk of price decline.

96. With a futures market, it is also possible to improve marketing and, especially, to enter into longer-term contracts (which in turn would help to improve production efficiency). Such security of supply would help tropical timber to regain more of its competitiveness relative to softwood plywood. A major obstacle to longer-term marketing is default risk. If one decides on one price, it is very likely that when the time for delivery arrives, this price will be very attractive to either the buyer or seller, giving the other side a strong incentive to default. With a futures contract, one can avoid creating this incentive by using reference prices rather than fixed prices; both buyer and seller can then fix their effective price through a futures market operation at a time of their choosing, and the futures exchange (through its clearing house) will operate the safeguards against a defaulting.

97. There are several ways to do this. One particularly interesting method is the use of "Exchange of Futures for Physicals" (EFPs) (explained in more detail in the annex). Essentially, they have the following characteristics:

- They remove the "transactional risks" of physical trade contracts, that is, contract parties no longer have an incentive to default because of price changes.
- This is because the price is no longer negotiated in the contract; instead, what is negotiated is the quality and delivery location premium or discount for the plywood to be delivered, and this is the only money that actually changes hands between the contracting parties.
- On signature of the contract, futures positions are exchanged. If the two parties do not have any prior positions, at the moment of signing the contract, the seller is assigned a "long" position (that is, he has the obligation to sell futures contracts, or to take delivery of physical plywood when the futures contract matures), and the buyer is assigned a "short" position (that is, he has the obligation to buy futures contracts in order to close out the position, or to deliver physical plywood). The seller will actually receive most of the price of his plywood by selling the contracts, and the buyer will be paying through his purchase of futures contracts.
- A futures position does not necessarily need to be opened at the time of contract signature; the buyer and seller can open positions at any time they want. In other words, EFPs provide great flexibility in terms of the timing of pricing decisions (examples of this are given in the annex).
- Compared to the standard way of using futures markets (with futures transactions done in parallel to physical trading transactions, rather than in an integrated manner), EFPs have the additional advantages that transaction costs are lower, one does not need to be afraid of being unable to realize fair market prices in a volatile market (in technical terms, there is much less risk of "slippage"), large volumes can be transacted with no impact on market price levels, and the transaction is possible 24 hours a day, rather than just during the times

that the exchange is open.

98. EFPs are attractive for both buyers and sellers. Obviously, they would also be very good for the liquidity of a commodity futures exchange. Plywood producers may thus consider using EFPs as their main contractual mechanism, that is, the standard contract discussed with buyers would not specify a fixed price, but an EFP. Such a decision on a matter of principle could be taken by all plywood producers together, or by the main ones - in any case, for competitive reasons, if a number of large exporters took the initiative, others would, in all likelihood, be forced to follow soon.

C. The Chinese and United States plywood futures markets

99. Four futures contracts are already traded on wood-based panels, two in the United States, and two in China. All four contracts are relatively new. In addition, 1996 and 1997 have seen the introduction of two futures contracts for wood pulp, a commodity for which an embryonic over-the-counter risk management market existed in the past, but which had never been traded on an organized exchange. In fact, futures exchanges have never been important for the timber industry, with only one, relatively small lumber contract traded for many years in Chicago; proposals to introduce lumber contracts in Europe, which emerged in the early 1980s, were never realized. It is worth looking in more detail at these new futures contracts.

100. Since 1993, futures contracts for tropical hardwood plywood have been traded on two futures exchanges in China: the Shanghai Commodity Exchange (SHCE) and the Suzhou Commodity Exchange (Suzhou is just north of Shanghai). Since late 1996, the SHCE has taken an ever increasing part of the whole plywood futures market, and Suzhou's role (with a US$ 50 billion turnover in plywood futures in 1996) has become fairly marginal. Plywood is now by far the largest contract traded on the SHCE, and the SHCE accounts for by far the largest turnover in worldwide forestry sector futures.

101. The SHCE futures contracts are on the basis of plywood imported from Indonesia or other origins at a discount or premium (on delivery, there is a discount for plywood of Malaysian origin). The contract is for a standard bale of 200 4 × 8' sheets of plywood, with a thickness of 2.7-3.2 mm; the quality standards used are BB/CC (a British standard) or JPIC. Delivery is possible into and from nine exchange warehouses in Shanghai and Ningpo, another port near Shanghai; the plywood delivered needs to have the required customs forms showing it conforms to official standards. In the case of quality disputes, the Government Bureau for Import and Export Inspection is able to verify product quality. Contracts are traded for each odd month.

102. Trade on the SHCE is very active; despite a decline in turnover since 1995, the weekly volume of plywood trade (which fell from over US$ 200 billion in 1995 to less than US$ 70 billion in 1996) surpasses the size of China's yearly imports. Although in terms of exchange volume, the quantity of deliveries is low (1.5- 3 per cent of volume, depending on the delivery month), if one compares this with imports, it can be seen that a major part of physical trade actually passes through the exchange's warehouses. This is easy to understand if one considers the functioning of the Chinese futures market: a very large part of turnover is accounted for by small speculators, who mostly play on changes in the spread between the nearest and the second contract month, but who do this without having much information on the real situation in the underlying market. This

gives interesting profit opportunities for those companies active in the physical trade in plywood, most of which are indeed active: the exchange has trading floors in several other towns in China, linked by satellite (as the exchange uses an electronic trading system, physical distance is not really important, as long as communications systems do not break down). Directly and through these trading floors, plywood traders, producers and end-users from throughout China are active on the exchange. One should also note that, although virtually all trade on the exchange is in the nearby months, bids are made up to one year out, so sellers could lock in prices far forward.

103. The opening up of a new futures exchange in Kuala Lumpur would be very interesting for many of those active on the SHCE. Around 200 trading companies in China are still allowed to use foreign exchanges (other companies are no longer allowed to do so, unless they receive a special exemption from the Government). If the delivery process of the Kuala Lumpur Commodity Exchange futures contract was well conceived, there would be very good opportunities for profitable arbitrage. In practical terms, the delivery time for a Kuala Lumpur contract should be set in such a way that a contract on which a Chinese trading company takes delivery in, say, Sarawak or Kalimantan can be delivered against the next expiring contract in Shanghai. This implies that the Kuala Lumpur contract should be set to expire two weeks before the Shanghai contract (loading, transport and unloading takes about five to six days, but one should also leave the time for customs procedures). In Shanghai, the last trading day of each contract is the 15th day of the contract month, and the delivery days are the 25th to the 27th days of that month; contracts are traded for January, March, May, July, September and November. So (to the extent that such a schedule would not clash with that for palm oil futures), the logical trading months for a futures contract in Kuala Lumpur would be February, April, June, August and October, with delivery in the second week after the closing day of the contract. The possibility of a December contract could be considered further, although the range of holidays in the December-January period, plus the seasonally low production due to the monsoon, may mean that the underlying physical volume of plywood is too low to allow January delivery.

104. The SHCE, like most exchanges in China, is eager to become an international exchange. While one or two years ago few foreign companies would have considered the Chinese futures exchanges as trustworthy institutions, the situation has improved quite a lot, with the Chinese Government taking drastic measures to make the exchanges function better. Futures price behaviour still does not always appropriately reflect underlying physical conditions but this is because there is so much speculative capital available and very few investment opportunities (all the futures contracts with a large underlying physical market have been closed down by the Chinese Government). Meanwhile, the Chinese exchanges have made a great effort to improve oversight, clearing and reporting. So once the Chinese Government allows foreign use (and the only real obstacle is the absence of a proper law to regulate such foreign use), foreign players are likely to become active on the Chinese exchanges. Considering the liquidity that the plywood futures market offers, and the direct link between this market and the South-East Asian plywood-producing region (ideally, price differences should be equal to transport costs and customs duties, which are both known factors), they would have little reason to use another market offering only small liquidity. There is thus not that much time to build up sufficient liquidity; if it was built up in time, the two exchanges could continue to exist side by side, although, with growing intra-regional integration, close collaboration could become a necessity fairly soon.

105. In the United States, futures contracts for wood-based panels were introduced by the

Chicago Board of Trade (CBOT) in 1994, and by the Chicago Mercantile Exchange (CME) in 1996. The CBOT contract is an index contract based for 50 per cent on softwood plywood prices, and for 50 per cent on OSB prices. Its trading unit is 100 m^3, compared to this, the proposed 10 m^3 for a tropical plywood contract looks small, but one has to realize that prices for softwood plywood and OSB are less than half those of hardwood plywood. The index is constructed on behalf of the exchange by a specialized company, which contacts a total of 30 companies, out of a pool of 60-90 potential quote suppliers, to obtain the f.o.b. mill prices at which they are willing to sell.

106. The CME contract is only for softwood plywood and, contrary to the cash-settled CBOT contract, it is delivery-settled. The CME contract has not been traded long enough to say whether it will fare better than the CBOT contract, which, with less than 900 contracts traded in its second and last year of active trade, was a failure.

107. For wood-pulp futures, two competing Scandinavian exchanges have each introduced contracts. The Finnish Options Exchange (Foex) introduced the first contract in February 1997, and the Swedish OM Group was set to follow in the second half of 1997. As in the case of the United States contracts for wood-based panels, the main difference between the two contracts will be in their settlement system. The FOEX contract, traded in Helsinki, is based on a new price index (published only since June 1996), based on prices reported by 50 companies. The OM contract, to be traded in London, is based on physical delivery. Both contracts are based on one type of pulp (northern bleached softwood kraft), which accounts for less than one third of total world pulp production, but its prices show a correlation of over 90 per cent with many other pulp prices. The feasibility study for the OM contract argues that "the issues of cost, sensitivity of private price data, manipulation, and accuracy explain why very few examples can be found of successful cash settled futures contracts for physical commodities. Most of the successful few utilize government-collected data."[5] The arguments used both in the case of the United States contracts for wood-based panels and the European pulp futures in favour of physical delivery and against cash-settlement are convincing, and in the case of tropical plywood futures too, settlement by delivery would appear to be the best option. However, developments in the respective markets during 1997 and 1998 will give a good indication of whether this opinion needs to be revised, and if the cash-settled contracts are more successful than the delivery-settled ones (despite the fact that the price indices used will have been so recent), one should look at this issue again for the proposed tropical plywood futures contract.

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[5] Craig Pirrong, *Wood Pulp Futures - a Product Whose Time Has Arrived*, Catalyst Consulting, Chicago, September 1996.

Chapter V

THE FEASIBILITY OF A TROPICAL PLYWOOD FUTURES CONTRACT

108. As discussed in the previous chapters, a futures market would undoubtedly be useful for tropical plywood producers. Unfortunately, this does not mean that a tropical plywood futures contract, when introduced, would automatically be successful. Firstly, there are a number of objective conditions that need to be in place before a futures market becomes feasible:

- The supply and demand for tropical plywood must be sufficiently large, there must be many potential players, and tropical plywood must be a fairly important component of these players' operations;
- The pricing of tropical plywood must be determined by free market forces, without monopolistic or undue government control;
- There must be a good grading system;
- Plywood price fluctuations must be sufficiently large to warrant the use of risk management techniques;
- There needs to be a well-functioning spot market for tropical plywood;
- The futures market must have the support of a broad group of commercial interests;
- There must be a sufficiently large group of speculators;
- Infrastructural facilities and other services should be sufficiently well developed, and the legal and regulatory framework needs to be conducive to futures market trading.

109. Moreover, using a futures market has transaction costs, and one of the main ones is related to the effective costs of opening and closing positions. This cost is directly related to the liquidity of the market: the more contracts there are traded, the easier it is to enter, or exit, the market. There is a vicious circle - the more the market is used, the more useful it is; and the less used it is, the less likely it is to be used. Therefore for a futures market to succeed, it has to be lifted, as it were, at once from non-existence to a fairly large turnover. Meticulous preparation is necessary for this, and the exchange has, among other things, to ensure the commitment of a sufficiently large number of large market players to use the market at least for a certain number of months. Adopting the use of EFPs as the standard contracting form for international tropical plywood trade would obviously be a major move in this regard.

110. Many of the conditions for introducing a successful tropical plywood futures contract have already been discussed in earlier chapters. It has been seen that the tropical plywood sector is indeed large enough, and that the price behaviour of a sufficiently large part of the international plywood traded is similar enough, to be able to talk of one market rather than a number of small segmented markets. The number of market players is also quite large, and no company or small group of companies really dominates the market. For producers, even if they are part of an integrated group, plywood is an important part of their operations, and the same is true for a number of end-users and traders, though not for all. Price formation is by market forces: the price setting powers of the Indonesian and Malaysian producers are, in effect, severely limited by market forces, including the threat of replacement by cheaper softwood plywood or other woodbased panels. Price volatility, in absolute terms, is not very high, but it is still relatively high in relation to profit margins.

111. There is a good infrastructure for futures trade in the South-East and East Asian regions. The Kuala Lumpur Commodity Exchange, like other exchanges in the region, is efficiently run, safe to use (thanks to a strong clearing house) and well-supervised (making attempts to abuse or manipulate the market difficult). There are sufficient brokers in the region; banks, upon which one often needs to rely for financing margin payments, have some knowledge of futures trade; telecommunications are reliable and efficient; and the logistics of trade are not unduly complicated by government regulations. In most countries in the region, the legal and regulatory framework allows efficient use of futures markets, although some problems remain (for example, currency controls in one or two countries may make it difficult for companies to put up the needed financial guarantees for futures trade, or taxation policies fail to differentiate between risk management and speculation); not only the main producers of plywood, but also representatives of the main buyers (Japan and China - in the latter through any of the 200 or so trading companies that are authorized to use foreign futures exchanges) are legally allowed to use a plywood futures exchange.

112. This chapter will discuss in more detail the issues of product grading - it will be argued that this will not cause a bottleneck - and the spot market for tropical plywood. The functioning of the spot market is important for the feasibility of a futures contract because it will ensure that the prices of the contracts traded on the exchange are indeed close to the real value of the plywood. If the market runs well, anyone could take delivery of a certain amount of plywood and sell this at a fair price, without any discount compared to what, say, a plywood exporter would have received. The spot market for tropical plywood is not as free and open as one would ideally like to see for a futures market. The challenge, then, is to devise a delivery mechanism which ensures a process of convergence between physical market prices and futures market prices. It will be argued this is possible, but may require an active engagement from major producers of tropical plywood.

A. Product specifications and quality standards

113. Plywood characteristics are generally well specified, and can be easily determined. Product specifications (see table 11 for a summary) include size, thickness, glueing, moisture resistance, surface finishing and various other technical specifications (for formaldehyde emission, structural strength, flame resistance). The required specifications vary with the intended use and from country to country. There is a general trend for most mills to strive for quality excellence to improve their competitive edge, quality assurance systems like ISO 9002 being increasingly relied upon both as a management tool and as a confidence-building tool.

114. Most of the countries of the Organisation for Economic Cooperation and Development (OECD), including the United States, the United Kingdom, Japan, France and Belgium, have adopted quality standards laying down minimum requirements for the quality of plywood (and some other panels, particularly particle board and hardboard). These standards must be respected by domestically produced plywood but are not necessarily applicable to imported plywood (except for thick plywood for use in construction, to which building codes normally apply). Nevertheless, they are generally specified in contracts, not only for imports from the OECD countries, but also for imports from China and the Republic of Korea (which both tend to use United States standards). So, in general, the output of most tropical hardwood producers conforms to internationally well-known standards: these are British standards for much of the

Table 11

Plywood product specifications

Size	Length: 2440, 2130, 1800 mm Width: 700, 800, 900, 1220 mm Most common size 4 × 8' in Japan; 3×6'; (the standard traditional module for the construction industry, and 3 × 8')
Thickness	2.7 - 27 mm • 9 and above: structural and semi- structural industry • 2.7 - 9 mm: industrial uses (mainly in furniture and joinery) • 4 - 27 mm: audio-visual goods, transport, packaging
Quality grade	Three qualities of veneer: A (the highest grade), B and C (the lowest grade). Most common grades are B/BB and BB/CC
Glue	Resin: the type of adhesive used in the manufacture of wood-based panels depends on the moisture resistance. The two types most currently used are *phenol-formaldehyde (PF)* for exterior grade panels and *ura-formaldehyde (UF)* for interior grade panels (PF has a lower formaldehyde emission but is more expensive). Another resin type is *Melamine Formaldehyde*. Bonding: MR (moisture resistant) glued (UF), WBP (water and boiling proof) glued (PF); WBP is more expensive.
Other criteria	• fire safety • grain direction of the ply • number of plies

trade to Europe (the main difference with other standards being that panels need to be finished on both sides), Japanese standards for exports to for trade to the United States, China and Republic of Korea Japan, and United States standards (unlike Japanese standards, American standards do not have a 10 % tolerance in thickness).

115. For a more detailed example of such product specifications we can look at the situation in Japan. Japan has established standards known as the Japanese Agricultural Standards (JAS) in which seven main types of structural plywood are regulated. The qualities tested for plywood generally cover six aspects, but certain modifications are made to the tests and grading of the different types of plywood in order to suit the intended end-use. The qualities tested are: type of adhesives used; moisture content; quality of surface veneer; quality of core sheet; strength of composition; and size of tolerance. In addition, the Japanese have introduced a formaldehyde emission standard, while other non-obligatory but important criteria are laid down in the Building Standards Act. If overseas sellers or manufacturers test their products locally, using an approved testing agency, they have the right to affix the JAS mark. Without the mark, many woodpanels will have difficulty finding a market, for example because construction companies cannot get Government-subsidized loans for their projects if they use products that do not bear the mark.

116. So detailed, well-known quality standards exist; moreover, the industry has developed a

well-functioning quality control system (independent services are easily available) and proper arbitration procedures in the event of conflicts over quality. An exchange, when introducing a futures contract, just needs to follow one of the established quality standards.

B. Delivery standards

117. There are two principal ways to close out a futures contract: by physical delivery, or by cash settlement (there are hybrid forms, but these are generally not advisable). Cash settlement is virtually excluded because of the difficulty in finding reliable cash quotations: effective prices are simply not publicly available. So physical delivery is the only possibility. With physical delivery, one needs to decide on the range of commodities deliverable, the standard contract size the delivery locations and delivery procedures (ex-warehouse? f.o.b.? does one allow EFPs).

118. As concerns the range of commodities deliverable, it is proposed to use, as standard, 3 mm plywood, corresponding to either Japanese or United States standards, and either in 4 × 8' or 3 × 6' size. Delivery of other types of plywood would be possible through EFPs only. The ready supply of such standard plywood is sufficiently high, and many factories have the flexibility to produce it in the short run if prices are reasonable.

119. Prices of thin plywoods (up to about 15 mm) behave in quite a similar manner, irrespective of their different physical characteristics; the price differences between the different types of plywood and 3mm plywood (the most common product) vary much less than the prices themselves. This means that producers and others active in the industry can reduce their exposure to price risk, even if they produce, say, mostly 12 mm plywood and the standard of the futures contract is 3 mm plywood: when using the contract for risk management, they would replace their exposure to the risk of absolute price variations for their plywood by the much smaller risk of a greater difference between the prices for their plywood and 3 mm plywood.

120. As long as Indonesian plywood is made deliverable against the contract, with delivery locations in Indonesian ports, there will be enough 3 mm plywood, produced by a sufficiently large number of mills and available from a sufficiently limited number of ports, to make market manipulation difficult and a contract easy to use. With regard to those who take delivery, 3 mm plywood is probably the only type of plywood for which competition is on the basis of prices: buyers do not require a continuity of supply, and will be willing to buy even from an unknown seller as long as the price is right.

121. In China, domestic plywood production accounted for 45 per cent of the total production of wood-based panels in 1996. Most of this plywood is only three layers (that is, 3 mm) thick. Although some thicker plywood panels are used (in particular, softwood plywood for cement modules), most of the demand for thicker panels is not met by plywood, but by other wood-based panels, in particular MDF. The MDF industry in China has grown very quickly over recent years, but as with virtually all its production consists of medium and thick panels, there is little competition with plywood. As long as plywood prices do not increase too much, this situation is likely to remain the same in the coming few years. In other words, the plywood industry in China, with regard to both local production and imports, will largely remain focussed on thin panels of around 3 mm.

122. The 3 mm plywood sold by Malaysian exporters to China is actually the same as the 2.7 mm plywood they sell to the Republic of Korea. The plywood sold to the Republic of Korea is under United States standards, which are quite stringent, while the 3mm sold to China is under Japanese standards, which allow a 10-per-cent margin for variations in thickness. In the case of Indonesia's large exports to Japan, and its somewhat smaller exports to other Asian countries, the 3 mm plywood sold is true 3 mm plywood. In the proposed delivery arrangements for a futures contract, with delivery possible both from Indonesia and from Malaysia, the delivery range would vary from 2.7 to 3 mm. As prices would be quoted per m^3, however, this would not have a great impact on the value of the products delivered.

123. The standard contract size of a futures contract cannot be too large. For a large part of their turnover, futures markets depend on small speculators, who could not afford large contracts and the risks they bring. If shipment by container was common, a container would have been a good standard contract size. However, shipment by container is rare, except in the case of fancy plywood. Normally, plywood is shipped in bulk, often together with sawnwood. Obviously, a container-size quantity of plywood in a port is of little value to its owner if he is unable to arrange transport to a buyer. This is a major problem which can only be resolved if some of the main mills shipping through the major ports agree to allow third parties (such as a nonlocal company or even a company from another country), who have become the owner of a quantity of plywood through the exchange's delivery process, to ship their small lot as part of a larger shipment arranged from that port, paying no more than a fair share of the costs.

124. As to delivery locations, there are four problems: there are many export ports; many of these ports have no plywood warehouses, as exporters store their plywood at the mill and transport it to the port only for loading; transport is not in standard lots, but often in bulk cargo; and contract size varies enormously, from 10 to 500 m^3.

125. It should be noted that delivery has to be after payment of all export duties and taxes, and after export licenses have been obtained. In Malaysia, forest land, and the exploitation of forest resources, is a State responsibility, not a Federal one. States have much leeway in determining logging regimes and taxation levels and taxes do differ strongly from one State to the other. In February 1997, the situation was as shown in table 12.

Table 12

Processing and export taxes on Malaysia's plywood industry
(effective rate in M$ per m^3 of plywood)

	Peninsular Malaysia	Sarawak	Sabah
Processing royalty	26	72	80
Export cess	40	0	70

Source: data provided by the Sabah Timber Industry Association. The industry is also taxed on its machinery, and its log imports, and pays the normal corporate rate on any profits; again, these taxes differ from State to State. Processing royalties are per m^3 of log input; costs for plywood are calculated assuming a 50-per-cent recovery rate (in reality, some mills do better, others do worse).

126. Clearly, with this type of taxation structure, the futures contract has to specify delivery after full payment of taxes, in order to insulate the contract from changes in the taxation system. The obvious drawback of this is that the futures contract is more difficult to use for domestic trade: one would normally expect domestic prices to move in tandem with international ones, but drastic taxation changes would break this link; only a government undertaking, or a tacit understanding, that changes in tax levels will be moderate, or announced at least six months in advance, would ensure that the futures contract could be used safely for domestic purposes (currently, announcements are made only two weeks in advance, which in any case has negative consequences for an industry forced to quote fixed prices two to three months forward).

127. With regard to export licensing, it is necessary to ensure that the plywood delivered to the exchange (and hence to a buyer who may have been on the futures market for a long time but does not have much experience in physical plywood trading) can indeed be exported. In Malaysia, export licenses are obtained on an annually renewable basis by most mills. In Indonesia, plywood can only be exported by its producers, not even by general traders; so in one way or another, non-Indonesian companies who take delivery of plywood in Indonesia against a futures market position need to be assured that their plywood can indeed be exported. A good modus operandi needs to be drawn up to avoid any problems in this area.

128. While there are many export ports, there are not so many as to make a reasonable choice of delivery points feasible. Consider the main ports in Indonesia: as can be seen in table 13, four ports (of which three are in Kalimantan) account for more than 55 per cent of Indonesia's plywood exports. Each of these ports also has a sufficiently large number of users to make control of delivery through this port (for price manipulation purposes) unlikely.

Table 13

Main delivery ports in Indonesia

Port	Number of mills delivering through the port	Total capacity of these mills (thousands of m^3)
Samarinda	20	2 620
Pontianak	14	1 290
Banjarmasin	14	1 270
Pekanbaru	11	980
Other ports	47	4 854

Source: data provided by the Indonesian Association of Panel Producers (Apkindo)

129. In Malaysia, it would appear to be necessary to have five ports: Bintulu, Miri and Sibu are of about equal importance for exports from Sarawak, while Kota Kinabalu and the nearby port of Sepangar Bay are, together with Sandakan, the largest ports for Sabah. It would seem difficult to have delivery points in Peninsular Malaysia, as production is low and most is not of the 3 mm type. All these ports, in Indonesia as well as in Malaysia, would allow for efficient plywood exports, and normal shipping activity is such that general cargo space at fair rates could be found without undue problems as long as the quantities to be shipped are not too small.

130. As has already been mentioned, a potential problem is that many of the ports have no plywood warehouses. Nevertheless, there would appear to be no technical or financial problems in adding warehouse space for plywood to the customs-free warehouses already functioning in these ports.

131. While shipment from Peninsular Malaysia is both in container and in bulk, shipment from Sabah and Sarawak is predominantly in bulk; in Sabah specially chartered ships with a capacity of 10,000 m^3 are sometimes used. The only liner ports in the region are Port Klang, in Peninsular Malaysia, and Singapore - all containers would need to be trans-shipped through one of these ports, thus adding to the transport costs. The transport routes are quite clear-cut; most plywood is transported to Tokyo or Osaka for sale to Japan, to Shanghai for sales to China, and to two ports in the Republic of Korea for sale there. Exports from Indonesia are in general also in bulk, transported on general cargo ships.

132. Typical contract sizes vary. The Chinese trading houses buy in 1,000-5,000 m^3 quantities, whereas the Korean buyers buy in 100-1,000 m^3 lots. For sales of some types of plywood, 10 m^3 contracts are common. In the case of Korean purchases, the relatively small contract size does complicate shipment, but as they are also large buyers of sawnwood it is often possible to combine the two. This would, of course, be very difficult for the small amounts that would normally underlie a plywood futures contract. It is possible, and probably preferable, to stipulate that physical delivery is only possible for multiples of, say, 10 contracts (that is, 100 m^3), forcing those who hold other numbers to either add more contracts, to a multiple of 10, or close out the difference.

133. These major delivery problems need to be resolved: anyone, whether with or without experience in the plywood sector should be able to take delivery from the exchange in the expectation of being able to sell the plywood at a fair market price; if not, the futures market will reflect this problem by trading far below the fair value of the plywood, which, in turn, will make the market less attractive for producers. It is possible to resolve these delivery problems, but only if the producers show their commitment to seeing a futures market become active.

134. Ideally, a system should be devised whereby anyone who sees a profit opportunity can place an order with a plywood mill for delivery f.o.b. at that mill's nearest port, even for the smallest possible quantity allowed for delivery against futures contracts (the quantity proposed here is 100 m^3), and whereby transport of this plywood to a price-competitive market, where resale is easy, can then be arranged without undue difficulties, delays or costs for those who take delivery (the holders of long positions).

135. In practical terms, this would imply two things. In the first place producers need to commit themselves to react flexibly to orders, even at short notice; that is, they should not discriminate on price against buyers who apparently (since they are unknown in the industry or are buying a standard lot size) wish to make delivery against the futures contract. Secondly, producers and exporters need to commit themselves to ensuring export procedures and easy transport, even after sale of their plywood or delivery by themselves against a short position. In practice, this would probably imply allowing those taking delivery of their plywood to "piggyback" on their transport arrangements, that is, to have their plywood transported together with that of the exporter, while paying a fair share of the transport costs.

Chapter VI

THE WAY FORWARD

136. In conclusion, the producers of tropical plywood could benefit greatly from the introduction of a tropical plywood contract. Unfortunately, however, a useful contract is not necessarily viable.

137. As has been argued in this paper, most of the conditions for a viable hardwood plywood futures market have been met. The market is sufficiently large, price risks are significant, the market is not dominated by any group of players, the hand of Governments in price formation is not unduly large, and the product is sufficiently standardized. Nevertheless, a number of obstacles remain. Some of these obstacles cannot be resolved by a futures market alone: active support from the industry is also required.

138. The best way to move forward on introducing a tropical hardwood plywood futures contract would seem to be to set up a committee of industry representatives (including representatives of the Indonesian plywood industry), charged with discussing contract specifications, as well as the following:

- Verification of the interest of the plywood industry in a plywood futures programme, and the organization of a comprehensive awareness-raising and training programme;
- Obtaining the permission of the Indonesian Government for its plywood mills to use a Malaysian futures contract;
- Elaboration of a viable delivery mechanism, which implies the obtaining of written commitments from key exporters to allow those taking delivery to share their transport arrangements;
- Design of a mechanism (new standard pricing clauses in contracts) to convince buyers to use the futures market.

139. Although there appears to be a moderately positive attitude towards the possibility of a plywood futures contract (with only a few of the larger players showing strong enthusiasm), it is necessary to strengthen this attitude, and ensure that both large and small companies are not just interested in futures contracts but will also be able to use them. As many plywood companies do not even have in-house expertise on currency risk management, this will require a comprehensive awareness-raising and training programme.

140. As has been argued, the active participation of the Indonesian plywood industry is important to increase the likelihood of success of the contract. Just as Indonesian palm-oil producers can use the KLCE for palm-oil price risk management, even though all delivery locations are in Malaysia, plywood mills could use a futures exchange which only stipulated delivery locations in Sabah and Sarawak. Unfortunately, this would weaken their interest, and, more generally would weaken the representativeness of the contract. So, to the extent possible, an effort needs to be made to make possible the delivery from Indonesian ports of plywood against the futures market. Current government regulations do not allow anyone but the original producers to export plywood. This needs to change, since taking delivery of plywood at an Indonesian port and then being unable to export it is obviously not a very attractive option.

141. Key exporters need to commit themselves to supporting a fair delivery system. Considering that plywood is normally stored in their own warehouses, not at the port, and then shipped in bulk cargoes, the only way to achieve this is for delivery to be, in a sense, "nominal": the delivered plywood would not be physically separated from the normal export flow (it would just be marked as belonging to a third party), and would continue to benefit from the same treatment in terms of customs clearing and transport arrangements. For larger quantities, this should not be too much of a problem, but, for smaller quantities, exporters may be required to give a certain number of undertakings, for example to provide space on one of their regular shipments to China. The buyer, of course, should pay a fair share of the related cost. The exchange would probably need an arbitration committee just to oversee these arrangements, and may also have to consider the provision of a guarantee against the risk that exporters in a certain port do not meet these obligations, leaving a third party who has taken delivery "stranded" with his plywood.

142. Competitive pressures would ensure that a share of the benefits of a futures market is distributed to buyers and end-users. Although many producers appear to be aware of the potential benefits of a futures contract, the same cannot be said of buyers, let alone end-users. To change this attitude, producers, assisted by the exchange, will need to make a major effort to educate their clients. The best way to do this would be to insist on a new type of pricing formula in physical contracts: rather than a fixed price, a reference price would be written into each contract, and the negotiation between buyer and seller would be on the premium or discount of a particular plywood delivery rather than on the absolute price.

143. Only after these steps have been taken should the exchange introduce a plywood futures contract; after all, introducing such a contract is expensive for an exchange, and some tangible commitment from the industry is a clear prerequisite. There is not that much time to do all of this. The Shanghai futures market has an active trade in plywood, and is very much interested in opening its market to foreign users once the Chinese Government allows it. If, by the time that happens (and it may be only some tree to five years away), a new exchange in Kuala Lumpur has built up good liquidity, it should be possible for the two markets to exist side by side (although, it might be best for them to establish a trading link). However if liquidity in Kuala Lumpur was low, users would move to Shanghai.

ANNEX I

PRACTICAL INTRODUCTION TO A FUTURES MARKET FROM THE POINT OF VIEW OF A PLYWOOD PRODUCER, TRADER OR END-USER

Some Key Questions Answered

What is a futures market?

A futures market is an organized market place with a number of characteristics:

- The market provides framework within which trade takes place: a physical trading environment (which can be a trading floor or an electronic network), a set of rules (trading rules), a system for gathering and distributing information on the trade that takes place (generally on a real-time basis), and a mechanism to make trade secure.

- Contracts ("futures contracts") are being continuously bought and sold on the market. Whereas in an auction, products are being sold one by one by the auction master to a large public of competitive buyers, on the futures market, all participants can be both buyers and sellers and, as a result, the market is highly competitive.

- The products which are traded are standardized. The comparison with an auction is again illustrative: for example in a coffee auction, each lot has different characteristics and potential buyers need to see and smell the beans in order to know what bids to make. In contrast, if coffee is traded in a futures market, potential buyers have no way to actually test the physical product. The exchange provides for a standard contract: a standard size, standard conditions of delivery, and a standard minimum grade. The trading on the exchange takes place only on the basis of price; all other contract specifications are standard. This makes trading very easy, and one can find a ready market to sell to or to buy from at any time.

- The market users are anonymous. If you are a large exporter, the news that you have a lot of plywood for sale may well depress prices. On the futures market, you can sell contracts without anyone (apart from your broker and the exchange officials) knowing you, or your company, are the seller.

- The exchange provides an environment in which trade can take place. Exchange officials are paid a salary, and do not make a profit on the basis of the way prices move. The exchange earns its money, firstly, by selling the price information it has on the trade that takes place on its floor (this is often its main source of income), and, secondly, by levying small fixed commissions on each contract traded. The exchange, and its staff, have an interest in maximizing the use of their market, and the only way they can do this is by providing an attractive market place, with fair treatment for everyone.

Futures markets exist for a large number of commodities, for currencies, for interest rates and for other financial assets. On these markets, what is traded is not the commodities (or

currencies, etc.) themselves, but contracts which provide for future delivery of these commodities. However, in practice, most users of these markets "close out" their earlier sales or purchases by opposite transactions, and in the end neither make nor take delivery. The futures market is not meant for physical delivery.

So why is a futures market useful for a plywood producer, trader or end-user?

A futures market is useful for plywood producers, traders and end users because, if the exchange is properly set up, its prices move in parallel to the prices on the physical market. This makes it possible to use the futures exchange to eliminate most of the price risks you are exposed to in the physical market and to anticipate physical market transactions.

To give an example: imagine you have an opportunity to obtain logs at attractive prices and you have the spare capacity to process them. However, you do not have a client for the plywood yet. If you buy the logs and start processing them without a client, by the time you find a buyer for the plywood, market prices may have declined and you make a loss in the process. So what do you do? You buy the logs and you simultaneously sell plywood futures contracts at a price that you deem attractive. If plywood prices decline, so will the price of the plywood futures contract; in other words, you will be making a profit once you close out your futures position (by buying a number of futures contracts identical to the number you had previously sold). To put some figures on this example:

- You buy the logs in January and need a plywood price of US$ 460 per m^3 to break even. The futures market price for March delivery is 500 US$ a m^3, and as your plywood exactly meets the requirements of the futures market, you know that this will also be close to the price you will obtain for your plywood on the physical market, if prices remain stable. But you do not want to speculate on this, so you sell, say, 100 plywood futures contracts of 10 m^3 each.

- You start to process the logs in February. Some potential buyers have shown up, but you do not like the price they are offering, and as you know you are protected against the risk of price declines, you refuse their offers. Finally, in mid-February, you get an attractive bid. Meanwhile, though, plywood prices, as represented by the price of the March futures contract, have fallen to US$ 470 per m^3. Your buyer offers you US$ 472 per a m^3.

- Once you have signed the sale at the fixed price of US$ 472, you close out your futures position by buying 100 contracts at an average of US$ 471 per m^3. You had sold them for US$ 500 per m^3, and so you make a profit of US$ 29 per m^3 (or a total of US$ 29,000).

- Adding up the price you received for the physical sale of your plywood and the US$ 29 profit, you realize a total of US$ 501 per m^3, giving you a respectable profit.

Other examples will be given later to illustrate how a plywood futures contracts would work.

Are prices on the futures market really fair? Is there not too much speculation and manipulation on the market?

In principle, everyone can use the futures market. Anyone who sees a profit opportunity can use it. The market is not monopolized by a particular group of people. The market is also closely regulated to avoid abuses. Yes, there is a lot of speculation and, occasionally, someone tries to manipulate the market. But if you are a producer, trader or end-user, there is very little risk that this will hurt you: dangerous situations are easy to avoid, and in fact you will benefit from the use of the market by speculators.

Why is that? Basically, if the market is "wrong" (that is, prices do not reflect the underlying supply/demand conditions), you normally have extra profit opportunities. For example, imagine that a manipulator is trying to push up prices. This means you will be able to deliver your plywood to the exchange at prices that are above fair market prices; as the manipulator would need to sell his plywood stock again one moment or another, you may even be in a position to buy it back later at a price below your own production cost.

How often is the market wrong? It happens, of course, but you have to realize that the price that you see on the futures market is the result of the interaction of hundreds, thousands, or even tens of thousands of people - it is the "common wisdom" of the market. If the price you see on the exchange is different from what you think it should be, you may be right - you may know better than all these other people. But it is equally possible that the market knows something that you do not know. For example, imagine that a large Chinese trading house knows it will be able to sell a large amount of plywood to a large construction company. It also knows that when it starts buying this plywood on the physical market, prices will go up. So what it does is it starts to buy futures contracts. Prices will also go up, but as the rest of the market does not know that this purchasing is being done by this Chinese company, the price increase will not be all that large (once the company starts using the physical plywood, prices will go up further, meaning it can resell the futures at a profit, which will compensate for the higher prices it pays in the physical market). So what you see, as an outsider, is that futures prices are increasing. Even though you do not know why, the market is not wrong: simply, the market is at a price level which reflects more and better information than you have at your disposal.

Who uses the futures market?

There are two categories of users of the futures market: those active in the underlying physical market (producers and so on) and those without any exposure to this underlying market. The first group are commonly called "hedgers", and the latter group "speculators", although reality is a bit more complicated than that. Producers, traders and end-users will, of course, speculate from time to time (without a futures market they would be speculating the whole time, trying to anticipate the way prices will move). Some speculators are people who put their eggs into many different baskets (so-called "portfolio investors"), knowing that some of their investments will go wrong but that, on average, they will do very well.

There are several groups in the category of speculators:

- **Locals**. These are small traders in futures contracts who make a living trading on the exchange floor. During the day, they continuously make sales and purchases, hoping that at the end of the day they will end up with a profit. They are the "oil" in the exchange machinery: at any moment, they are ready to buy or sell, ensuring that it is easy to put even large orders into the market without making a heavy impact on the price.

- **Small outside speculators**. These are individuals who either try to be keep abreast of developments in the plywood sector and, try to anticipate where its price will go on that basis, or who simply gamble on the direction of the price movement. As a group, they tend to lose money on the exchange, although some do quite well.

- **large outside speculators**. This group includes managed funds (which consist of many small speculators who have put their funds together and recruited a specialized money manager to decide on fund placements) and institutional investors such as pension funds. These large speculators tend to be well informed, and are often willing and able to take large positions; as such, they are perfect counterparts for large trade users (hedgers) of the exchange.

- **Arbitrators**. Arbitration is low-risk speculation. Imagine, for example, that a Chinese trading company notices that the plywood price on the Shanghai futures exchange is relatively high compared to the price on the Kuala Lumpur exchange. It will buy Kuala Lumpur contracts and simultaneously sell contracts for the same amount in Shanghai, and then take delivery on the contracts it has bought, ship the plywood to Shanghai and deliver it, making a low-risk profit in the process. A speculator who is unable to do this type of international transaction but notices that price differentials are such that it would be profitable, could simply buy Kuala Lumpur contracts and sell contracts in Shanghai, on the assumption that trading houses will do the same and thus reduce the price differential.

Do I need to be in Kuala Lumpur to use the futures market?

No. To use the futures market, you need information on its current prices and a "gateway" that allows you to buy and sell contracts on the exchange.

The exchange will do its utmost to distribute its price information. Yesterday's prices will be in the newspapers, and could be sent to you by fax. Current prices are reported on a real-time basis on Reuters and other information services, and also, for a low subscription fee, on the Internet. You can also phone your broker at any time to find out the latest prices (most brokers will make an effort to keep their clients well informed about happenings in the market).

Your gateway to the exchange will be a broker. Brokers are licensed intermediaries who are authorized to deal, on your behalf, on the exchange. They have to meet a number of strict criteria to be approved and have to follow an equally strict code of conduct in their relations with their clients; their business is rigorously controlled to ensure they do not abuse their clients' confidence.

A broker works on a commission for each contract he buys or sells on behalf of his client; this commission is bilaterally negotiated. The client signs an agreement with the broker, in which, among other things, the financial arrangements between the broker and the client are laid out (for example, the client usually has to deposit a certain sum of money in an account controlled by the broker to guarantee his transactions). Then, every time the client wants to buy or sell a certain number of contracts, he phones his broker; the broker then phones his agent on the exchange floor (or, in an electronic, computer-based trading system, inputs the order into a computer) and if the agent can place this order, the broker confirms the transaction to his client (all of this could take less than a minute). A broker can only do his best, and cannot be held liable if, for instance, in a period of strong market movements, he has difficulty in placing his customer's orders.

What exactly will I be trading when I use the futures market?

If you trade on the futures market, you trade a standard product, with standard quality specifications, standard delivery locations and procedures, and a standard delivery time. Your own product may be identical to the standard product: you may wish to protect your production of standard plywood, which you sell through one of the ports where you can make delivery against a futures contract and which you plan to delivery at the same time as the dates provided for in the futures contract. In such a case the price of your product will behave exactly like the price of the futures contract, and you can use the futures market as a "perfect" risk management tool.

However, in practice, your product and your sales mechanism is likely to be different, in one way or the other, from that of the exchange's standard contract. In that case, the price for your product may behave slightly differently from the futures price. The difference between the two prices is called the "basis", and the risk you run that this price difference will worsen for you, when you are hedging, is called the "basis risk". However, this basis risk is not all bad news. Even if you have fully covered your risk exposure with futures contracts, you run the risk of making a loss because the prices for your product may decline faster than the futures price. On the other hand, if you analyse the way that this price difference has behaved in the past, you may actually be able to improve your profit margin.

How does this work? The price that you get for your product in reality consists of two components: the world market price, and the basis, that is, the premium or discount for your production in the delivery location that you are choosing. If one always sells for a fixed price, one has little choice: the two components have to be fixed at the same time. With a futures market, you can "lock in" an attractive world market price without having to accept an unfavourable basis, and lock in a good basis afterwards.

To give an example: imagine that you observe the following price behaviour, knowing that the price difference in the past between the exchange and the price offered for your plywood has been -10 to -15 US$ per m^3. All prices are in US$ per m^3.

Day	Exchange price	Price offered to you
1	440	420
2	455	440
3	460	450
4	470	455
5	495	470
6	505	475
7	475	455

What would have been the best sales strategy? Evidently, if one does not have a futures exchange, or if one cannot use the exchange, your sales can only be based on the prices actually offered to you. A very good (or rather, very lucky) marketing manager could then have decided to sell on day 6, receiving US 475 per m^3. If one uses a futures exchange, the decision on the timing of sales does not only become better in terms of the price one can expect to receive, but also in terms of predictability (objective measures replace in part a marketing manager's instinct for the way the market is moving). In fact, the same marketing manager, being just as lucky in his timing, could have realized a price of US$ 495 per m^3.

How? By analysing the basis. He would have noticed that on day 3, the basis (the price difference between your product and the exchange) was only US$ - 10 per m^3, much better than usual. Still, in his opinion, world market prices would continue increasing, and so he decides to sell the physical product, for US$ 450 per m^3 and, simultaneously, buy a futures contract for US$ 460 per m^3. On day 6, he decides the period of price increases is over and sells the futures contract for US$ 505 per m^3, thus making a profit of US$ 45 per m^3. He thus realizes a total price of US$ 495 per m^3.

Notice that if the marketing manager had been less lucky, and had waited one day too long before realizing prices were no longer increasing, he would still have done better with this futures market strategy than with a straightforward sale. If he had sold on day 7, he would have received US$ 455 per m^3. By selling on day 3 and simultaneously buying a futures contract subsequently sold on day 7, he would have realized an effective price of US$ 465 per m^3. Moreover, this improved marketing behaviour is based on facts, and on an analysis of normal price differences; it does not rely on some form of magic or perfect foresight.

Are there financial requirements to use the exchange?

Yes. The exchange guarantees to all its users a perfect contract performance. There are no defaults on the exchange. This guarantee is only possible because the exchange, in turn, requires guarantees from all its users. This guarantee is called the "margin". When one enters into a futures position, one deposits a "safety deposit", equivalent to a few per cent of the price of the underlying contract (this deposit has to be sufficient to cover the total possible loss which may result from two days of relatively large price changes). If the futures market position is loss making, one is asked to put up additional "margin calls", so that at any time a sufficiently high guarantee is in place. If one is unable to pay these margin calls, positions are forcibly closed out.

Now, for a hedger, any loss on the futures market should be compensated by a simultaneous gain on the physical market. But this gain is not necessarily already realized, so the hedger may have a cash flow problem. This is unlikely to occur if the hedger has good bank relations: the value of the commodities that the hedger can give as collateral increases, and thus the bank should be willing to provide extra finance to pay for margin calls (if banks are familiar with the business, they should be able to manage the whole hedge account without necessarily even bothering the hedger). In other words, for a sound risk management programme, one needs either good relations with one's bank or sufficient access to cash.

Are there other problems in using the exchange?

Yes. There are two important pitfalls:

- You need to be sure why you are using the exchange. Decisions which, when taken, looked good, may still result in lost opportunities. This should be accepted by the company's decision makers.

- You need to invest in skills and systems. Skills, because the better one understands the futures market, the better opportunities one has. Systems, because like any other activity where money is involved, there is a potential for abuse.

If you can always predict where the market is going, you do not need to manage your risks on a futures market (but then again, you do not need to bother at all about having or working in a plywood company; you can simply become very rich as a speculator). Of course, hindsight is always perfect, and there will always be people who say, "Why did you do this? You should have known where prices were going". It is imperative that when using a futures market, one knows why one is doing it - or in other words, that decisions are accepted as sound ones even if, in the end, it turns out that other decisions would have been better. To give two examples:

- You are able to buy logs at what you think is a good price. As you do not want to lose this opportunity, you decide to sell plywood futures to "lock in" the currently attractive plywood price. But as it happens, plywood prices improve even more: rather than the good profit you locked in, you could have had a very good profit. But could you have afforded the risk that prices would go down?

- As an integrated plywood producer, with your own concessions, you know what plywood prices you have to realize in order to make your processing operations profitable. You also need this profit, as you have planned to expand your operations in the second half of the coming year, so you need the cash flow. In the months preceding the budget year, and the first few months of that year, you are able to lock in prices that will give you the required cash flows. But prices move further up, and you have foregone this profit opportunity. However, could you have afforded price declines, which would have squeezed your cash flow and sabotaged your investment plans?

So, using a futures market always has an opportunity cost. But remember, you never know where the market is going: instead of this opportunity cost, you could have made a very real financial loss by not using the futures market. What matters is that you have reached your

objectives: you have obtained attractive prices, reached your budget, locked in your processing or trading margin, and so on.

What about skills and systems?

Futures contracts are new instruments providing many opportunities; the best-skilled will be able to make the most of them. However, company managers should never just rely on these individuals. They need to put good systems into place to ensure that if a trader makes errors, or deliberately moves away from the company's policies, losses can be contained within bounds acceptable to the company. This is neither very cumbersome nor very complex, but it does require deliberate policy action before the risk management programme starts, and a vigilant attitude towards the actual use of the futures market. In recent years, several manuals have been written on this issue. One, available from UNCTAD (Commodities Branch, UNCTAD, Palais des Nations, 1211 Geneva 10, Switzerland; *fax* +41 22 907 0047) is "Company control and management structures - the basic requirements for a sound use of market-based risk management instruments".

Will there be "options" too?

Options are like insurance contracts. They provide protection without forgoing the opportunity to benefit from price improvements. For instance, a producer could be protected against price declines, but still make extra profits if prices increase. This type of protection, of course, also has a cost. While the cost of a futures contract is, effectively the "opportunity cost" of forgoing the opportunity to benefit from price improvements, for an option one pays a premium. As in the case of insurance, the better the level of protection, and the longer the period of protection, the higher the premium. Options are without doubt useful instruments.

For products such as crude oil, gold, coffee or cotton, option contracts are traded actively on exchanges alongside futures contracts. However, for such options trade to be possible, trade in futures contracts needs to be very active, and quite a few months forward. While possible in the future, one cannot just introduce options in the initial stages of a futures exchange.

Will there be any link between my physical trade and the futures exchange?

This is, in principle, up to you. Even if you use the futures exchange, you can expect your physical trade to remain largely the same. You may decide to ignore the futures market, except for obtaining price information. Whether you can afford to do this in practice is another question: companies are likely to make large efficiency gains when using the futures market, and if your competitors use it and you do not, you risk losing your market share.

Can I use the futures market to improve my marketing?

Yes, you can revolutionize your marketing by using the futures exchange, because you can offer pricing clauses that are likely to be much more attractive to your buyers.

One way to do this would be by offering price-to-be-fixed contracts. These are contracts which are identical to your normal contract with a buyer, with one exception: rather than setting

a fixed price, you give the buyer the possibility to fix his price between now and the delivery date, with reference to the futures market. For example:

- You sell 500 m^3 of plywood, to be delivered in three months' time, in June.

- The pricing clause stipulates that the buyer will, on delivery, pay the average price of the futures market for the July contract, on the days he will indicate as "price fixation dates", minus US$ 5 per m^3.

- On the day you signed the contract, the July contract quoted US$ 400 per m^3. You thought this price would remain stable or even increase, but your buyer thought prices would go down further, and was therefore unwilling to offer a price acceptable to you. So, if it were not for this price-to-be-fixed clause, you would have been unable to sign a contract.

- Your buyer is right, and prices start falling. He fixes the price of 150 m^3 when the futures price is US$ 390 per m^3, another 150 m^3 at the price of US$ 370 per m^3, and the last 200 m^3 at 380 per m^3. On average, the futures price he fixes is US$ 380 per m^3. He only pays US$ 370 per m^3 to you for your plywood, because in your contract you had determined that your plywood has a value US$ 10 below the price of the plywood which acts as the futures exchange reference. So your buyer is satisfied.

- However, this is not all that you receive. On the day you sign the contract, you sell futures contracts for 500 m^3, at a price of US$ 400 per m^3. Every time your buyer informs you he wishes to fix the price of a part of the plywood he is going to buy, you buy back an equivalent amount of futures contracts. So, evidently, you will be able to close out your futures position having paid an average of US$ 380 per m^3. In addition to the US$ 370 per m^3 which you are receiving from your buyer, you have a profit of US$ 20per m^3 on the futures market.

An even more powerful tool is the Exchange of Futures for Physicals (or EFP). With an EFP, you can disconnect your physical trade contract from the pricing of your plywood: in other words, you can sign your physical contracts in such a way that your physical production (and your use of warehousing space and financial resources) is optimized, while managing the prices you receive separately. How does this work? There are different possibilities, which all have in common that positions in the futures market are exchanged, at the moment of contract signature.

Possibility 1

- You notice attractive prices but you have no plywood for sale. Nevertheless, you know you will sell using an EFP, so you start selling futures contracts. For 1,000 m^3, you realize an average sales price of US$ 410 per m^3.

- You have now produced your plywood, and you have found a buyer. No money changes hands, but with the plywood, your futures position is transferred. So you have actually realized a price of US$ 410 per m^3.

- Your buyer now has to liquidate the futures position. He does this quite well, and pays an

average of US$ 395 per m^3 to close out all contracts. So, effectively, he has paid US$ 395 per m^3.

Possibility 2

- Your buyer and you both know that plywood transactions are likely to be in the form of EFPs. So both of you start accumulating futures positions in anticipation of the physical transaction. You sell contracts for 1,000 m^3 at an average price of US$ 420 per m^3, and your future buyer buys contracts at an average of US$ 400 per m^3.

- You sign the physical contract, and your futures positions are exchanged. In effect, that means that both your positions are at once liquidated. You have realized a sales price of US$ 420 per m^3 while your buyer has obtained his plywood at US$ 400 per m^3.

Possibility 3

- Neither you nor your buyer have sold or bought any futures contract by the time you sign the contract, which specifies an EFP condition. No money changes hands: the buyer gets the plywood and a "short" futures position (that is, he has to buy back this position), and you get an equivalent "long" position (that is, futures contracts you can sell).

- Both of you now have until the expiry of the futures contracts to fix the prices in the best way you can.

And this is not all. You should realize that the price you receive (or pay) for plywood has two components: the world market price for plywood, and the premium or discount for your type of plywood, delivered at your normal delivery sites (as mentioned before, this latter component is called the "basis"). Without a futures market, every time you negotiate a price for your plywood you have to fix these two components simultaneously. Clearly, this is not optimal: it is possible that the world market price is high but because of, for example, problems in your usual port, or a temporary market glut for your type of plywood, the discount on your plywood is much larger than usual.

With a futures market you are no longer forced to fix these two components of your price at the same time. In other words, you can fix ("lock in") an attractive basis even while world market prices are low (when you would normally refuse to sign a contract), and fix the world market price later when it is more attractive. For example, you know that the normal discount for your plywood, delivered from your usual port, and compared to the 3 mm plywood futures contract, is US$ 20 per m^3. On a given date, you are offered a price only US$ 10 per m^3 below the futures market price of US$ 400 per m^3. You see that the basis is attractive, but you think world market prices will increase. So you decide to sell your physical product at US$ 390 per m^3, but simultaneously buy futures contracts equivalent to the physical amount you sold. And you are right: futures prices increase to US$ 420 per m^3. You make a profit of US$ 20 per m^3, and so, you are able to realize a total price of US$ 410 per m^3. Had you waited with your physical sale until the world market price had reached the US$ 420 level, you would normally have realized only US$ 400 per m^3; after all, normally, your plywood sells at a discount of US$ 20 per m^3.

This, of course, is only an overview of some aspects of futures markets and the possibilities they offer; there is much more to be learned by those who wish to use such markets.